Bay Area Emissions Inventory Summary Report: Greenhouse Gases

Base Year 2011

Updated: January 2015

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

939 Ellis Street
San Francisco, California 94109

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Table of Contents

Table of Contents (continued)

Bay Area Greenhouse Gas Emissions Inventory: 2011

The Bay Area Air Quality Management District published its first regional greenhouse gas (GHG) emissions inventory for base year 2002 issued in November 2006, followed by an updated GHG emission inventory for base year 2007 issued in February 2010. The inventory described below builds upon these earlier inventories and provides estimated greenhouse gas emissions for the San Francisco Bay Area in year 2011.

As part of an ongoing effort towards developing an improved and complete greenhouse gas emissions inventory, the following updates are planned in the near future as supplements to this GHG emissions inventory report:

- **Alternative emission inventory forecasting methods.** The forecasts developed for this summary report include some state level GHG reduction measures, such as the Pavley regulation AB 1493 (see page 10), but it is largely a business-as-usual forecast. Future forecasts will explore a range of GHG emission reduction measures. In addition to federal and state measures, GHG reduction efforts made at the local level in the San Francisco Bay Area region will also be included in the future forecasts. These alternate emission forecasts will take into account the effects of ongoing, adopted, and foreseeable greenhouse gas reduction measures at the city and county levels.

- **The black carbon (BC) emissions inventory for the Bay Area.** BC emissions have both important climate and health impacts. BC is a short-lived climate pollutant with a large contribution to warming relative to its concentrations and is a component of diesel particulate matter, which is a potent toxic air contaminant. BC is the most strongly light-absorbing component of particulate matter (PM) and contributes to climate change by directly absorbing light which leads to increased global average temperatures and accelerated snow and ice melt. BC also reduces the reflectivity of earth's surface and induces changes in the pattern and intensity of precipitation.

- **Regional greenhouse gas emissions inventory for the Natural and Working Lands Sector (Formerly, the Forest Sector) for the Bay Area**. The natural and working lands GHG emissions inventory will track the sequestration of carbon dioxide from the atmosphere by forests (including woodlands and urban forest) and rangelands (including shrublands and grasslands) in the Bay Area and emissions of greenhouse gases to the atmosphere through processes that occur in the forests and the wood product systems. The natural and working lands GHG inventory includes removal of carbon dioxide by plant life and GHG emissions from prescribed and wild fires, the combustion and decomposition of agriculture and other plant residues, and wood products.

- **Methane (CH_4) assessments and concentration measurements for the San Francisco Bay Area Region.** Recent study has found that the methane emissions were being under estimated in the United States based current emission estimation methods. Most of the methane emissions under estimations were from the raising of livestock and the extraction of oil and natural gas. The District will conduct methane assessment and/or mitigation work in the San Francisco Bay Area to measure concentrations of methane emissions on regular basis. To achieve accurate and reliable CH4 concentration measurements, new instrumentation will be purchased and installed at strategic locations throughout the Bay Area Air District. Also a thorough review of methane emission estimation methods will be performed and updates will be made as necessary.

I. Introduction

The Bay Area Air Quality Management District (Air District or BAAQMD) is the regional public agency responsible for protecting air quality and reducing public health impacts of air pollution in the San Francisco Bay Area. The Air District's jurisdiction encompasses all of seven counties - Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, Napa - as well as the southern portions of Solano and Sonoma counties. The Air District is governed by a 22-member Board of Directors composed of locally-elected officials from each of the nine Bay Area counties. The Air District promulgates and enforces regulations to reduce emissions and ambient concentrations of criteria air pollutants[1] and toxic air contaminants as provided by the Federal Clean Air Act, the California Clean Air Act, and State legislative mandates. The Air District also issues permits for stationary sources of emissions, prepares air quality plans, operates an extensive grants and incentives program, and conducts public outreach and education.

The Air District established a climate protection program in 2005 to explicitly acknowledge the link between climate change and air quality. In November 2013, the Air District's Board of Directors adopted a resolution outlining greenhouse gas reduction goals and making a commitment to develop a regional climate protection strategy[2]. Rising global temperatures and associated local shifts in weather patterns as a result of climate change threaten to undermine years of progress in improving air quality in the San Francisco Bay Area. From the regulatory standpoint, it makes sense to protect air quality and the climate in an integrated fashion because many of the same sources emit both criteria pollutants and greenhouse gases that contribute to climate change. Many longstanding air quality strategies, such as programs to reduce motor vehicle travel by promoting alternatives to the automobile, improve energy efficiency, and encourage cleaner technologies, also reduce emissions of greenhouse gases.

[1] The six criteria air pollutants are reactive organic gases (ROG), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and lead (Pb).
[2] http://www.baaqmd.gov/The-Air-District/Board of Directors/Adopted-Resolution.

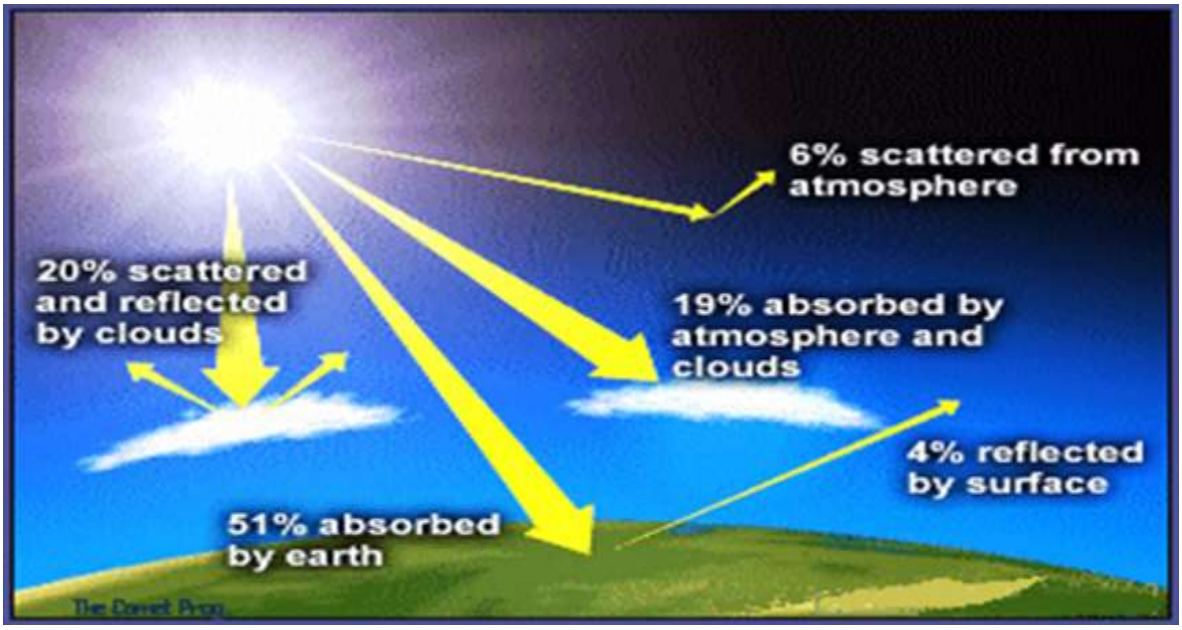
The Air District regularly prepares inventories of criteria pollutants and toxic air contaminants to support planning, regulatory and other programs. This greenhouse gas inventory is based on the methodologies and protocols used to prepare emission inventories for criteria air pollutants[3]. The GHG inventory is intended to support the Air District's climate protection activities, as well as to support efforts by local governments to develop local GHG inventories and climate action plans.

II. Climate Change and Greenhouse Gas Emissions

The *greenhouse effect* is a natural process (Figures 1 and 3) whereby some of the radiant heat from the Sun is captured in the lower atmosphere of the Earth, thus maintaining temperatures in a range that supports life. The gases that help capture solar heat are called *greenhouse gases* (GHGs). Life as we know it could not exist without these naturally-occurring greenhouse gases. However, adding greenhouse gases into the atmosphere above natural levels increases the strength of the greenhouse effect and results in more heat being trapped in the atmosphere. Over time, this build-up of GHGs leads to climate change, which produces a wide range of impacts on ecosystems and the environment.

All climate changes on Earth once occurred naturally. However, in the past several centuries, human society has been altering the climate and environment through changing agricultural and industrial practices. Before the Industrial Revolution, human activity

Figure 1: The natural balance of solar energy received by Earth



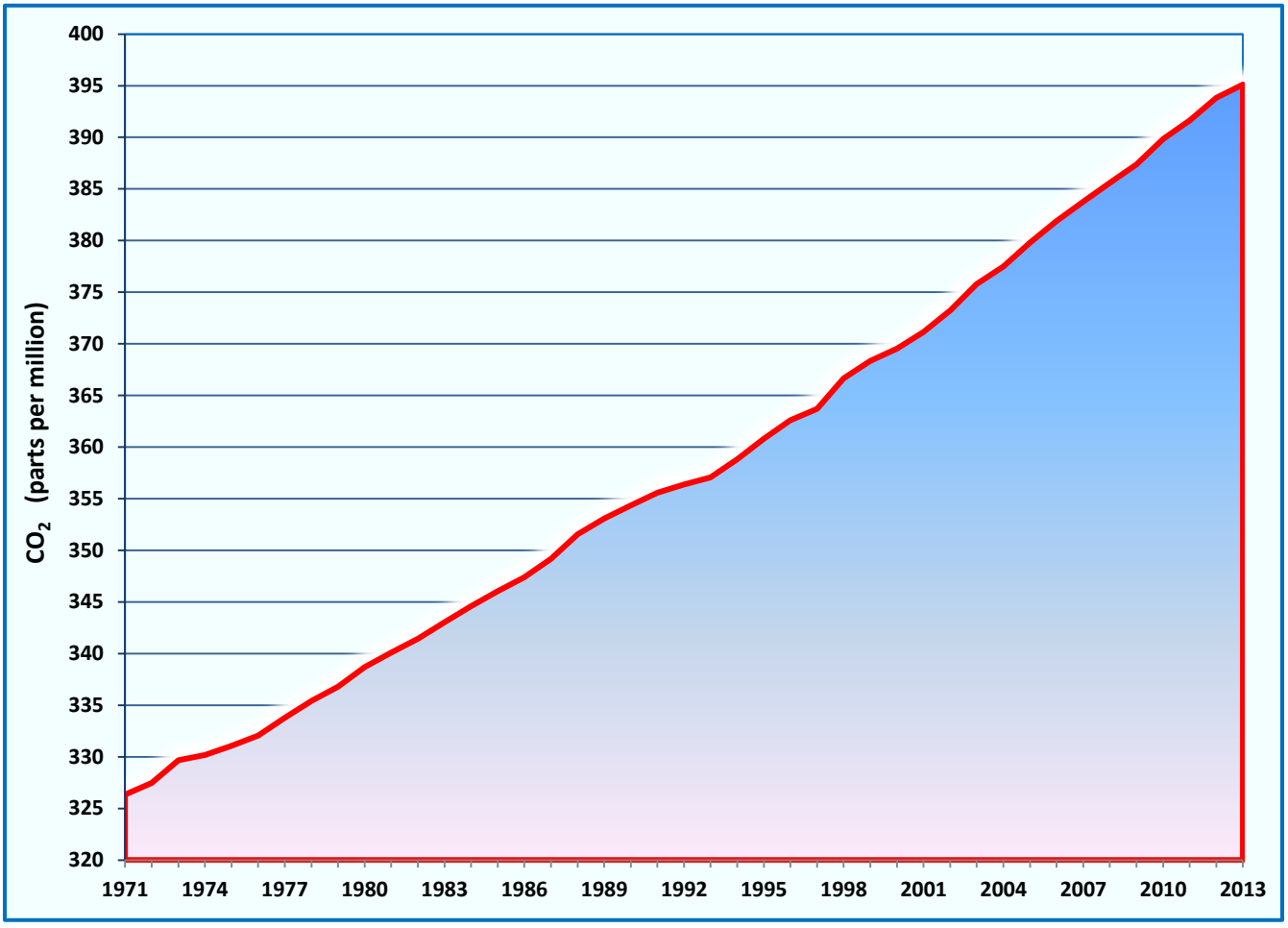
Source: The COMET Program (Established by U.S. National Oceanic and Atmospheric Administration (NOAA) and University Corporation for Atmospheric Research)

[3] Bay Area Emissions Inventory, Summary Report: Criteria Air Pollutants, May 2014.
Online: http://www.baaqmd.gov/Divisions/Planning-and-Research/Emission-Inventory/Criteria-Pollutants.aspx

released very few gases into the atmosphere. But now, humans are affecting the natural mixture of gases in the Earth's atmosphere through fossil fuel combustion, deforestation, and a wide range of impacts related to growing population and consumption. Increased concentration of GHGs is upsetting the natural balance of incoming and outgoing solar energy (Figure 1 and 3). Emissions of carbon dioxide (CO_2) are the leading cause of global warming, with other GHGs also contributing.

After remaining in a narrow range from 265 to 280 parts per million (ppm) over the last 10,000 years, carbon dioxide concentrations have been rising in the last two hundred years. Current CO_2 levels have risen to 395.1 ppm (Figure 2, Table A, Nov. 2013), an increase of 41%. With CO_2 levels currently increasing by approximately 2.0 ppm per year[4], CO_2 concentrations can be projected to reach 500 ppm or more within the next 50 to 60 years in a "business as usual" scenario.

Figure 2: Atmospheric Carbon Dioxide (CO_2) Concentrations



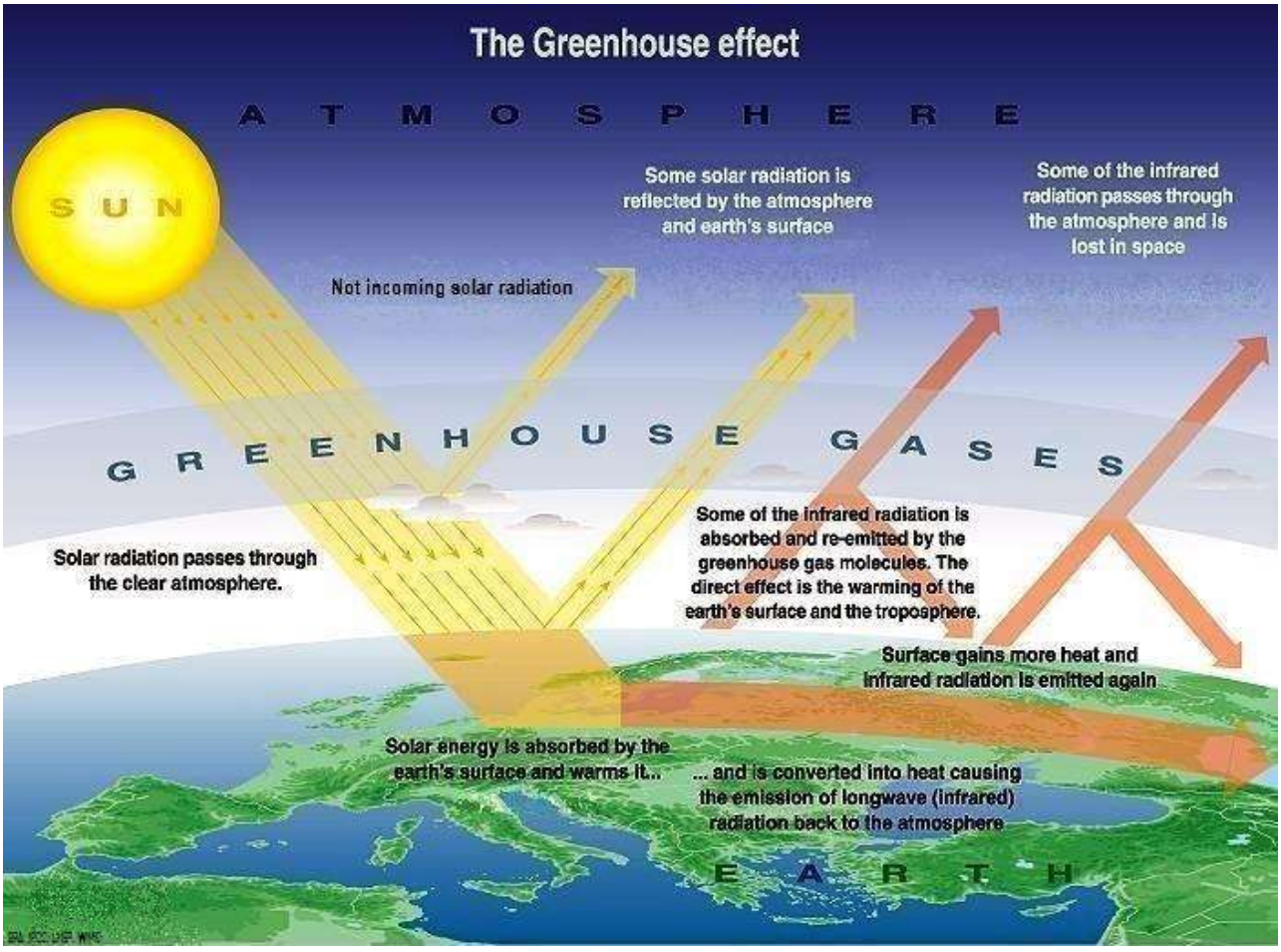
[4] Intergovernmental Panel on Climate Change, Summary for Policymakers. *Climate Change 2007: The Physical Science Basis.*

Table A: Atmospheric Carbon Dioxide (CO_2) Concentrations

Year	1971	1974	1977	1980	1983	1986	1989	1992	1995	1998	2001	2004	2007	2010	2013
CO_2 (ppm)	326.3	330.2	333.8	338.7	343.0	347.4	353.1	356.4	360.8	366.7	371.1	377.5	383.8	389.9	395.1

Source: Mauna Loa Observatory, U.S. National Oceanic and Atmospheric Administration (NOAA)

Figure 3: The Greenhouse Effect Process



Source: United Nations Environmental Program (UNEP)

Some greenhouse gases, including water vapor, carbon dioxide, methane, nitrous oxide, and ozone, occur naturally in the atmosphere. Various human activities, however, add to the levels of these naturally occurring gases. Human activities also create other non-natural GHGs such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. This GHG inventory addresses the "Kyoto 6" greenhouse gases which were identified as the key GHGs by the Kyoto Protocol of 1997: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The "Kyoto 6" gases are

recognized as the leading GHGs by the Intergovernmental Panel on Climate Change (IPCC) and the US EPA; they are also identified in AB32, the Global Warming Solutions Act adopted by the State of California in 2006. These gases vary in terms of their mass in the atmosphere, the amount of time that they persist in the atmosphere, and their heat-trapping potential.[5]

Carbon Dioxide (CO_2) is released to the atmosphere when fossil fuels, wood and wood products, and solid waste are burned. CO_2 emissions are mainly associated with combustion of carbon-bearing fossil fuels such as coal, gasoline, diesel, and natural gas used in transportation, heating, and energy-generation processes. Other activities that produce CO_2 emissions include oil refining, cement manufacturing, and waste and forest management.

Biogenic Carbon Dioxide (Bio-CO_2) emissions are categorized separately from anthropogenic CO_2 emissions because they are emitted from materials derived from living cells (excluding fossil fuels, limestone and other materials that have been transformed by geological processes). Bio-CO_2 originates from the materials that were grown through the process of photosynthesis. Examples of these biogenic materials are wood, paper, vegetable oils and food, animals, and animal and yard waste etc. Thus the carbon these materials contain was recently present in the atmosphere and it was absorbed by these materials during their growth. So emissions from combustion of these materials do not add any net carbon dioxide to the atmosphere. The largest sources of bio-CO_2 emissions in the Bay Area are landfills, fireplaces, and wastewater treatment plants. Consistent with CARB's methodology for GHG inventories, bio-CO_2 emissions from these sources are not counted in the anthropogenic (man-made) emissions inventory directly.

Methane (CH_4) is emitted during the production and transport of coal, natural gas, and oil. Decomposition of organic waste in municipal solid waste landfills, the raising of livestock and other agricultural activities, stationary and mobile fuel combustion, and gas and oil production fields are the major sources of methane emissions in the Bay Area.

Nitrous oxide (N_2O) is emitted from agricultural and industrial activities, combustion of solid waste and fossil fuels, and during production of adipic acid and nitric acid. Municipal wastewater treatment facilities, fuel combustion, and agricultural soil and manure management are the major contributors of nitrous oxide emissions in the Bay Area.

Very powerful greenhouse gases (high global warming potential gases) that do not occur naturally include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur

[5] There are other anthropogenic substances in the atmosphere that may impact climate change by means of positive or negative radiative forcing, such as aerosols and black carbon. These substances have not been included in this GHG inventory, however, because their contributions to climate change are still the subject of on-going research.

hexafluoride (SF_6). Industrial processes such as semiconductor manufacturing, use as refrigerants and other products, and electric power transmission and distribution systems are the major sources of HFCs, PFCs and SF_6 emissions in the Bay Area.

Greenhouse gases differ in their ability to absorb heat in the atmosphere. The heat-trapping potential of each GHG is generally expressed in terms of its *global warming potential* (GWP) in relation to carbon dioxide, which is assigned a GWP of "1". High GWP gases such as HFCs, PFCs, and SF_6 are the most heat-absorbent. Methane traps over 21 times more heat per molecule than carbon dioxide, and nitrous oxide absorbs 310 times more heat per molecule than carbon dioxide. To express the combined impact of various GHGs using a common unit, estimates of greenhouse gas emissions are presented in *carbon dioxide equivalents (CO_2e)*, which weight each gas by its global warning potential. Table B shows the GWPs and Atmospheric Lifetimes for different greenhouse gases for a 100 year time horizon. The global warming potentials used in this report are in accordance with the Second Assessment Report (SAR) of the Intergovernmental Panel on Climate Change (IPCC).

Table B: Global Warming Potentials (GWPs) and Atmospheric Lifetimes (years)

Gas	GWP	Atmospheric Lifetime
CO_2	1	50-200
CH_4	21	12±3
N_2O	310	120
HFC-23	11,700	264
HFC-32	650	5.6
HFC-125	2,800	32.6
HFC-134	1,300	14.6
HFC-143	3,800	48.3
HFC-152	140	1.5
HFC-227	2,900	36.5
HFC-236	6,300	209
HFC-4310	1,300	17.1
CF_4	6,500	50,000
C_2F_6	9,200	10,000
C_4F_{10}	7,000	2,600
C_6F_{14}	7,400	3,200
SF_6	23900	3200

III. Greenhouse Gas Emissions Inventory

An emissions inventory is a detailed estimate of the amount of air pollutants discharged into the atmosphere of a given area by various emission sources during a specific time period. This GHG emissions inventory for year 2011 builds on the Air District's many years of experience preparing inventories of criteria and toxic air pollutants.

This emission inventory includes direct GHG emissions due to human activities within the boundaries of the BAAQMD. The emissions are estimated for industrial, commercial, transportation, residential, forestry, and agriculture activities in the San Francisco Bay Area region of California. For generation of electricity, both direct greenhouse gas emissions from locally generated electricity in the Bay Area and indirect emissions from out-of-region generated electricity for consumption in the region are reported.[6]

Emissions of CO_2, bio-CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 are estimated using the most current activity data (e.g., cubic feet of natural gas burned or vehicle miles traveled) and emission factors from various sources. Activity data used in preparing this GHG inventory is the same as is used in preparing the Air District's criteria and toxic inventories. Emission factor information was obtained from the U.S. Department of Energy's (DOE's) Energy Information Administration (EIA), The Environmental protection Agency (EPA), the California Energy Commission (CEC), and the California Air Resources Board (CARB).

Methodology

Emission sources can be broadly divided between stationary and mobile sources. Stationary sources can be further divided between point and area sources. Stationary emission sources identified on an individual basis or as a single source are called *point sources*. Electric power generating plants and oil refineries are examples of point sources. Based on Air District permits for stationary sources, the Air District maintains a computer database with detailed information on operations and emission characteristics for nearly 4,000 facilities, which include roughly 25,000 different sources, throughout the Bay Area. Activity data on the sources are collected at the process level from each facility and are updated regularly as part of permit renewal. The greenhouse gas emissions from these sources are calculated by multiplying activity data by standardized emission factors for each greenhouse gas. These emission factors take into account fuel-specific carbon content and the percent of carbon that oxidizes to convert to carbon dioxide emissions. Some of the combustion emission factors for various fuels used for this emissions inventory are shown in Table C. Examples of activity data used to develop the inventory are shown in Table D.

[6] This GHG inventory does not include other types of indirect emissions, such as emissions related to the production of goods imported to and consumed in the Bay Area (food products, motor vehicles, clothing, etc.).

Stationary emission sources that are not identified individually are called *area sources*. Area sources are groups of numerous small emission sources, which individually do not emit significant amounts of pollutants, but together make an appreciable contribution to the emission inventory. Many area sources do not require permits from the Air District, such as residential heating; a wide range of consumer products such as paints, solvents, and cleaners; and most restaurants. Some facilities considered as area sources do require permits from the Air District, such as gas stations and dry cleaners. Emissions estimates for area sources are developed based on estimated activities and emission factors for various categories.

Table C: Generalized GHG Emission Factors (lbs. /usage unit)

Fuel	CO_2	CH_4	N_2O	Usage Unit
Liquid Fuels				
Distillate Fuel (Fuel Oil, Diesel)	22.4	0.00053	0.00019	gallon
Jet Fuel	21.1	0.00052	0.00019	gallon
Kerosene/Naphtha	21.5	0.00050	0.00018	gallon
Liquefied Petroleum Gases (LPG)	12.8	0.00025	0.00002	gallon
Motor Gasoline	19.6	0.00055	0.00020	gallon
Residual Fuel (Bunker C Fuel Oil)	26.0	0.00022	0.00021	gallon
Aviation Gasoline	18.4	0.00052	0.00019	gallon
Bio-diesel	20.7	0.00049	0.00018	gallon
Propane	12.7	0.000003	2.3E-07	gallon
Butane	14.7	0.000003	2.3E-07	gallon
Gaseous Fuels				
Natural Gas	120.6	0.00020	0.00020	1000 ft^3
Landfill Gas	110.5	0.21050	0.00024	1000 ft^3
Digester Gas	104.7	0.02997	0.00030	1000 ft^3
Carbon Monoxide	116.1	0.00270	0.00019	1000 ft^3
Refinery Waste Gases	139.0	0.00320	0.00022	1000 ft^3
Solids				
Refuse/Waste	2,000	0.29790	0.08980	ton
Wood and Other	3,814	0.29790	0.08980	ton
Agriculture Waste Burning	174	0.14000	0.35000	ton
Petroleum Coke	6,769	0.44920	0.10630	ton

Mobile sources consist of on-road motor vehicles and off-road mobile sources. Examples of on-road motor vehicles are cars, trucks, buses and motorcycles. Off-road mobile sources include boats, ships, trains, aircraft, and garden, farm and construction equipment. Greenhouse gas emissions from on-road motor vehicles were calculated using CARB's EMFAC2011 model together with vehicle miles travelled (VMT) and other activity data by county from the Metropolitan Transportation Commission's (MTC) Regional Transportation Plan (RTP2030). GHG emissions from off-road mobile sources (excluding ships, trains, and aircrafts) were estimated using CARB's OFFROAD2007 model. Aircraft emissions are calculated for air travel within the Air District boundaries. GHG emissions for ships are calculated for ship travel within 100 miles of the San Francisco coastline.

Table D: Bay Area 2011 General Statistics

County	Population[b] (Millions)	Daily Electricity Usage[c] (Megawatt hours)	Daily Natural Gas Usage[c] (Million cu. ft.)	Daily Gasoline Sales[d] (Million gallons)	Daily VMT[e] (Millions)
Alameda	1.565	29,967	121	1.626	39.921
Contra Costa	1.098	24,695	607	0.966	27.926
Marin	0.257	3,831	22	0.336	6.497
Napa	0.140	2,825	12	0.140	5.117
San Francisco	0.816	15,994	98	0.402	13.563
San Mateo	0.740	12,424	62	0.777	21.101
Santa Clara	1.847	44,889	215	1.772	42.870
Solano[a]	0.316	6,325	55	0.543	7.780
Sonoma[a]	0.440	6,859	28	0.480	10.974
Total	**7.218**	**147,808**	**1,219**	**7.041**	**175.748**

a. Portion within Bay Area Air Quality Management District
b. Association of Bay Area Governments (ABAG)
c. California Energy Commission (CEC)
d. California State Board of Equalization
e. CARB's EMFAC2011-SG Version 1.1

Revisions to the Previous GHG Inventory

This emissions inventory estimates greenhouse gas emissions produced by the San Francisco Bay Area in 2011. This inventory updates the Air District's previous GHG

emission inventory for base year 2007[7]. All activity data has been updated to reflect more current industrial activity, motor vehicle travel, and economic and population growth. Most of the methodologies for calculating emissions remain the same. As part of ongoing effort towards developing an improved and complete GHG emission inventory, emissions are included for some new greenhouse gas categories. These categories are: 1) petroleum refining processes such as: basic oil refining processes, wastewater collection and separation systems, wastewater treatment facilities, and pumps and compressor seals; 2) sulfur manufacturing facilities; 3) pharmaceuticals and cosmetics; 4) large bakeries; 5) waste management on farms; 6) semiconductor manufacturing; 7) soil vapor extraction and air stripping; 8) sanitary sewers. Combined emissions for these categories are relatively small, less than 0.2 percent of the total 2011 GHG emissions inventory.

This emissions inventory update also includes benefits of regulations adopted by CARB pursuant to Assembly Bill 1493 (Pavley, 2004). As discussed in the Trends Section below, these "Pavley regulations" require improved fuel economy and fuel standards in light duty cars and trucks, thus resulting in lower projected GHG emissions for future years.

Ship and boat emission estimation methodology was updated in accordance with CARB, which resulted in a slight increase in emissions.

Imported electricity emission estimates decreased due change in emission factors. Base year 2011 emission estimates were made using the Pacific Gas & Electric's (PG&E's) emission factors rather than the Climate Registry's emission factors which were used for the previous GHG emissions inventory.

In addition, improvements were made in estimating historical emissions for the District's point sources. It led to some decreases in historical emissions.

IV. Summary of Bay Area GHG Emissions

In 2011, 86.6 million metric tons of CO_2-equivalent ($MMTCO_2e$) greenhouse gases were emitted by the San Francisco Bay Area (83.9 $MMTCO_2e$ were emitted within the Bay Area Air District and 2.7 $MMTCO_2e$ were indirect emissions from imported electricity). A breakdown of Bay Area CO_2e emissions for three principal greenhouse gases (carbon dioxide, methane, and nitrous oxide) and high-GWP gases (HFCs, PFCs, and SF6) is shown in Figure 4 and Table E.

[7] Bay Area Emissions Inventory, Summary Report: Greenhouse Gases. February 2010.
Online: http://www.baaqmd.gov/Divisions/Planning-and-Research/Emission-Inventory/Greenhouse-Gases.aspx

Carbon dioxide accounts for 90.3 percent of total Bay Area greenhouse gas emissions in 2011. CO_2 emissions are mainly associated with carbon-bearing fossil fuel combustion. Other activities that produce CO2 emissions include mineral production, waste combustion, and land use and forestry changes. (Bio-CO_2 emissions are tracked and shown separately in Tables L through U and Table X and are not counted in the anthropogenic emissions inventory directly.)

Methane (CH_4) emissions also contribute to climate change and represent 3.0 percent of Bay Area's total CO_2-equivalent GHG emissions. Major sources of methane emissions in the Bay Area are the municipal solid waste landfills, raising of livestock and other agricultural activities, stationary and mobile fuel combustion, gas and oil production fields, and natural gas distribution systems.

Nitrous oxide (N_2O) emissions account for 1.7 percent of the total 2011 GHG emissions inventory. Municipal wastewater treatment facilities, fuel combustion, and agricultural soil and manure management are the major contributors of nitrous oxide emissions in the Bay Area.

Emissions from high-GWP gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) make up about 4.9 percent of the total CO_2-equivalent emissions. High-GWP gases are substitutes for stratospheric ozone depleting substances (ODS) (e. g., Chlorofluorocarbons or CFCs). These gases are used in applications such as refrigeration and air-conditioning, semi-conductor/electronic industry manufacturing processes, and electric power distribution systems.

Figure 4: 2011 CO2- Equivalent Emissions by Pollutant

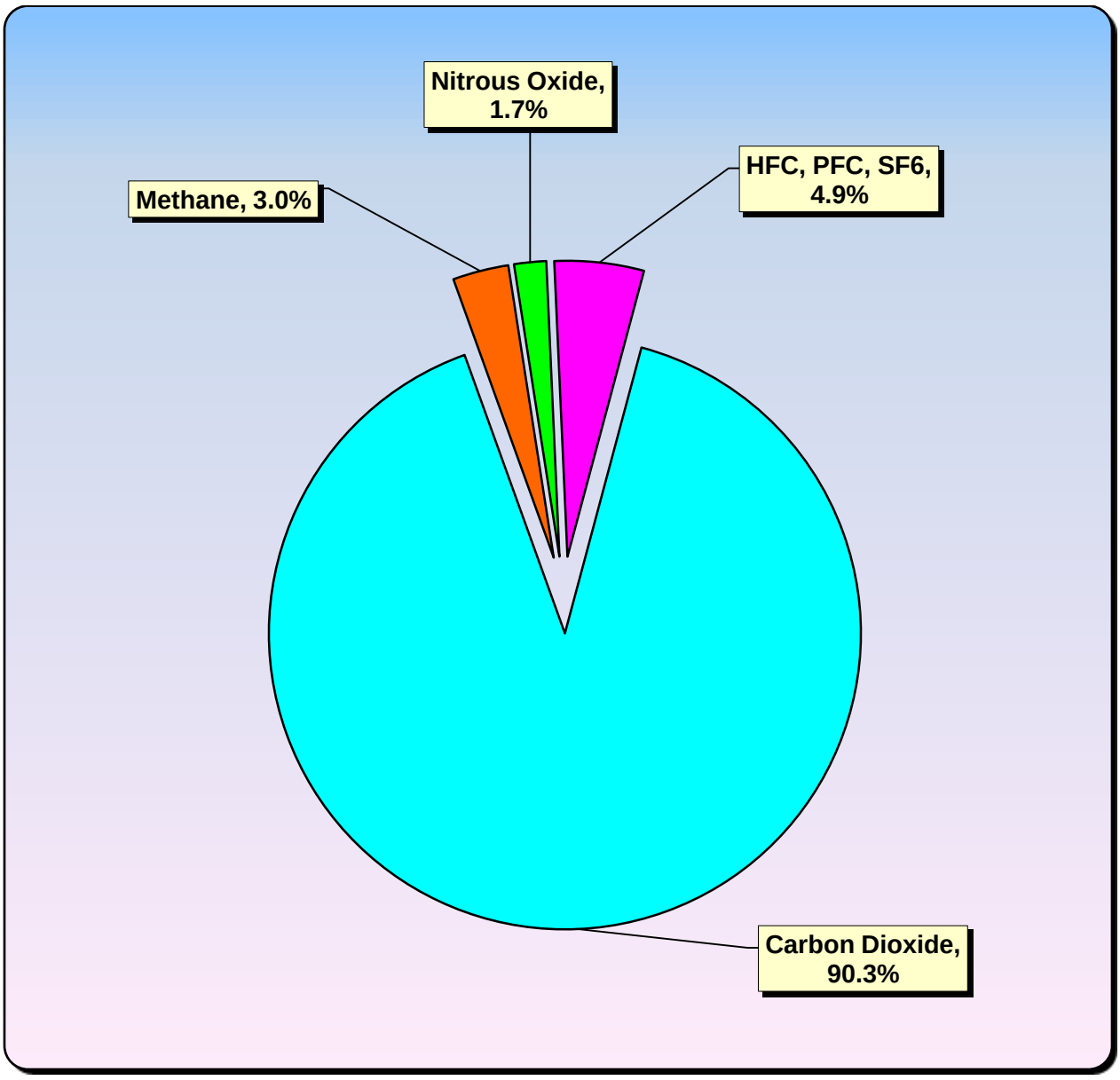


Table E: 2011 CO2- Equivalent Emissions by Pollutant

Pollutant	Percentage	CO2-Equivalent (Million Metric Tons / Year)
Carbon Dioxide	90.3%	78.2
Methane	3.0%	2.6
Nitrous Oxide	1.7%	1.5
HFC, PFC, SF6	4.9%	4.3
Total	**100%**	**86.6**

GHG Emissions by Sector

This GHG emissions inventory is divided into six sectors: transportation, industrial and commercial, electricity and co-generation, residential fuel usage, off-road equipment, and agriculture and farming. Greenhouse gas emissions by end-use sectors are shown in Figure 5 and Table F.

Combustion of fossil fuels in the transportation sector was the single largest source of the San Francisco Bay Area's greenhouse gas emissions in 2011. The transportation sector contributed about 39.7 percent of greenhouse gas emissions in the Bay Area. Categories included in this sector are on-road motor vehicles, locomotives, ships and boats, and aircraft. Light-duty vehicles (cars and light-duty trucks) accounted for more than three-fourths of the emissions from the transportation sector, as shown in the breakdown provided in Figure 7 and Table H.

The industrial and commercial sector (excluding electricity/co-generation and agriculture/farming, which are reported separately) was the second largest contributor with 35.7 percent of total GHG emissions. Industrial and commercial sources include industrial processes such as oil refining, natural gas and other fuel combustion, waste management (e. g., waste recycling, landfills, and composting), cement manufacturing, fuel distribution, refrigerant usage, and some other small sources. A breakdown of emissions by industry sector is shown in Figure 6 and Table G.

Energy production activities such as electricity generation and co-generation were the third largest contributor with 14.0 percent of the total GHG emissions (including imported electricity emissions). California imports about one-fifth to one-third of its total electricity usage, mainly from other western states. The Bay Area used about 56.0 million megawatt hours of electricity in 2011. Approximately one-third of the electricity was generated outside of the Bay Area. Electricity and co-generation facilities within the Bay Area Air District emitted about 9.4 $MMTCO_2e$ emissions in 2011; emissions from electricity imports were estimated to be 2.7 $MMTCO_2e$. Whereas Bay Area power plants mainly use natural gas and other clean-burning fuels, a portion of the electricity imported from out of state is from coal-fired power plants which produce higher CO_2 emissions on a per megawatt basis. Therefore, although imported electricity is a relatively smaller share of the Bay Area's electricity mix, out-of-region electricity generation sources contribute a larger share of GHG emissions.

Figure 5: 2011 Bay Area GHG Emissions by Sector

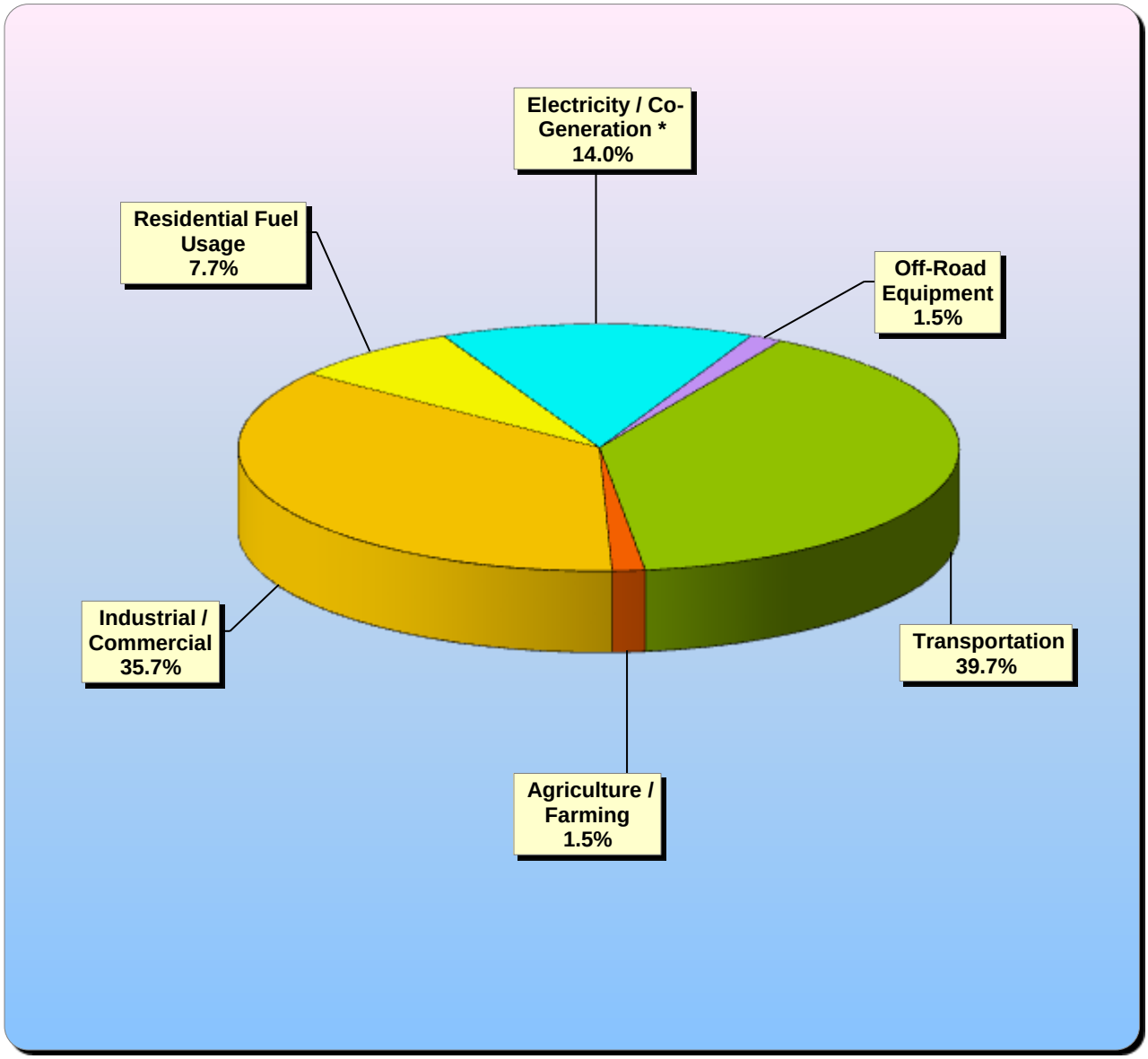


Table F: 2011 Bay Area GHG Emissions by Sector

End-Use Sector	% of Total Emissions	CO2- Equivalent (Million Metric Tons / Year)
Industrial / Commercial	35.7%	31.0
Residential Fuel Usage	7.7%	6.6
Electricity / Co-Generation *	14.0%	12.1
Off-Road Equipment	1.5%	1.3
Transportation	39.7%	34.3
Agriculture / Farming	1.5%	1.3
Total	**100%**	**86.6**

***** Includes Imported Electricity emissions of 2.7 $MMTCO_2E$

The contribution from residential fuel combustion was the fourth largest with 7.7 percent of the total GHG emissions. Residential fuel combustion emissions are primarily from space heating, cooking and water heating. Domestic natural gas combustion accounted for the vast majority off GHG emissions; 96.2%, from the residential sector. Liquefied petroleum gas (LPG) and other liquid fuels accounted for 2.4% and solid fuels attributed to 1.4% of the total emissions from this sector.

Off-road equipment such as construction, industrial, commercial, and lawn and garden equipment contributed 1.5 percent of the total GHG emissions.

Agriculture and farming sector accounted for 1.5 percent of the total greenhouse emissions in the Bay Area. Agriculture activities contributed to greenhouse emissions through various processes including the following: enteric fermentation in domestic livestock, livestock manure management, farm equipment, crop cultivation, agricultural soil management, and burning of agricultural and farming residues.

More detailed information on greenhouse gas emissions by source category, for the region and for each county, is provided in Tables L through U. Table X contains the list of the 200 largest greenhouse gas emission point sources/facilities in the San Francisco Bay Area.

All emissions related data tables in this GHG emissions inventory report are available online[8].

[8] http://www.baaqmd.gov/Divisions/Planning-and-Research/Emission-Inventory/Greenhouse-Gases.aspx

Figure 6: 2011 Industrial/ Commercial Sector Emissions Breakdown

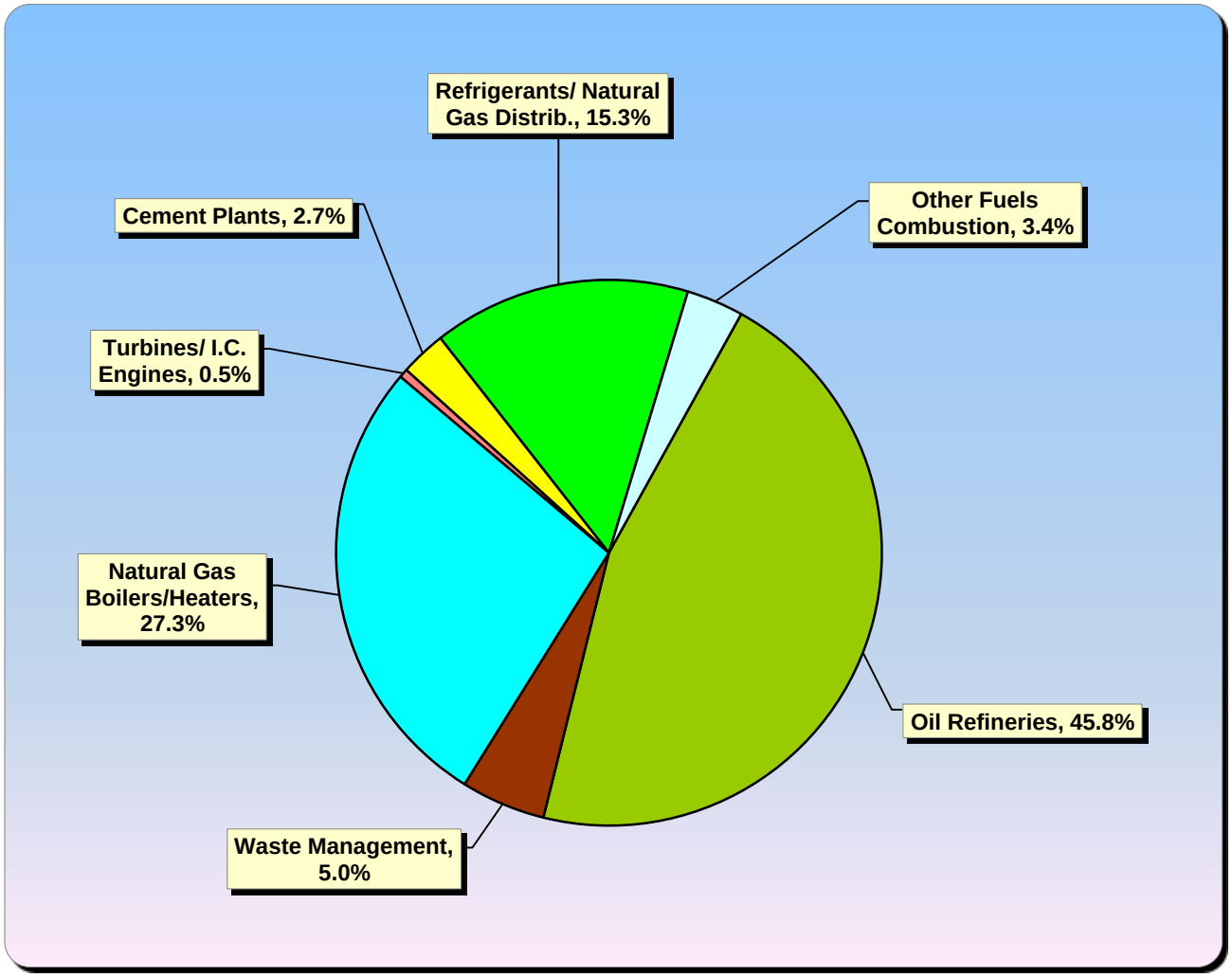


Table G: 2011 Industrial/ Commercial Sector Emissions Breakdown

Source Category	% of Total Emissions	CO2-Equivalent (Million Metric Tons / Year)
Oil Refineries	45.8%	14.2
Waste Management	5.0%	1.6
Natural Gas Boilers/Heaters	27.3%	8.4
Turbines/ I.C. Engines	0.5%	0.2
Cement Plants	2.7%	0.8
Refrigerants/ Natural Gas Distrib.	15.3%	4.7
Other Fuels Combustion	3.4%	1.0
Total	**100%**	**31.0**

Figure 7: 2011 Transportation Sector Emissions Breakdown

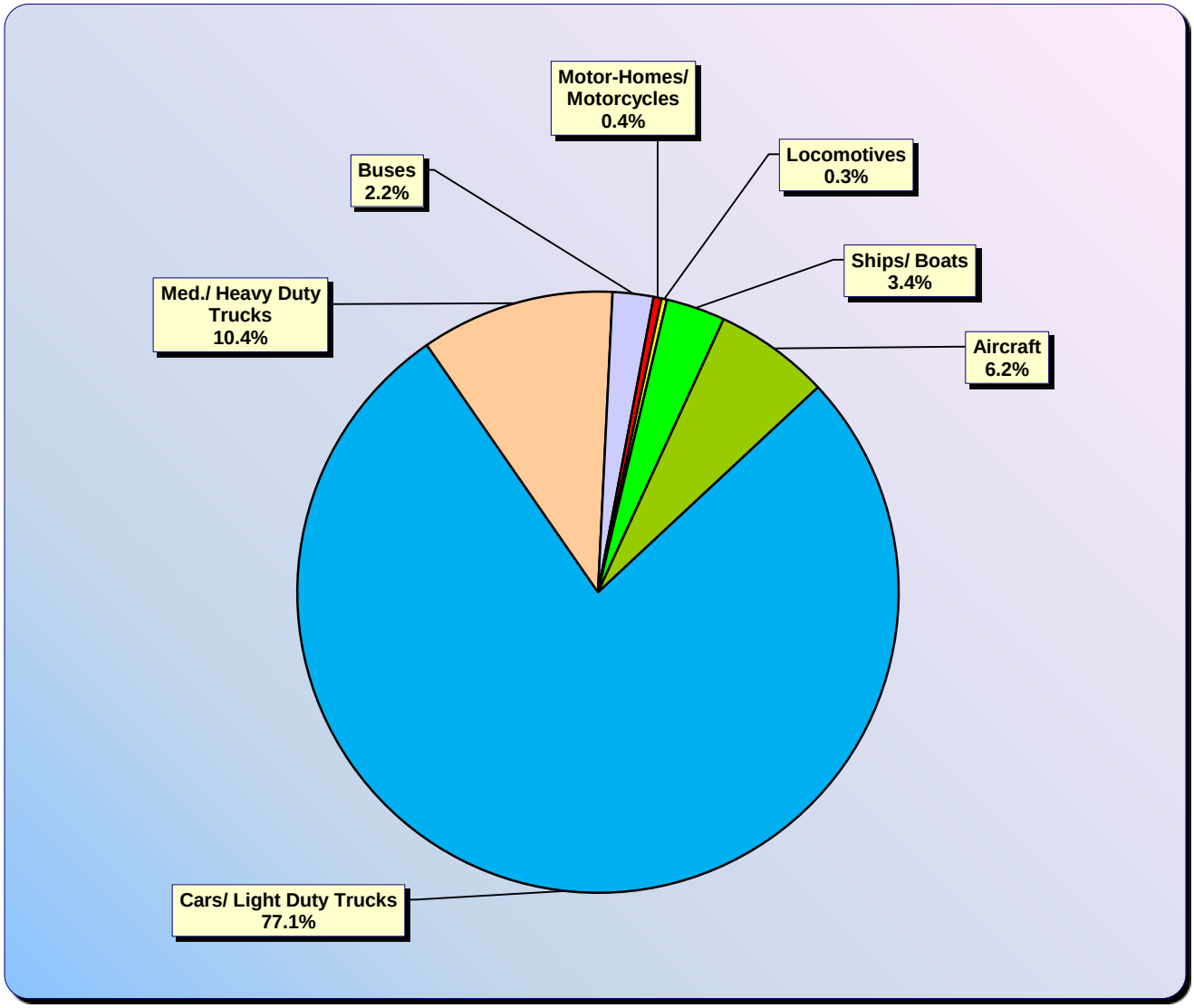


Table H: 2011 Transportation Sector Emissions Breakdown

Source Category	% of Total Emissions	CO2-Equivalent (Million Metric Tons / Year)
Cars/ Light Duty Trucks	77.1%	26.5
Med./ Heavy Duty Trucks	10.4%	3.6
Buses	2.2%	0.8
Motor-Homes/ Motorcycles	0.4%	0.1
Locomotives	0.3%	0.1
Ships/ Boats	3.4%	1.2
Aircraft	6.2%	2.1
Total	**100%**	**34.3**

GHG Emissions by County

GHG emissions for the nine Bay Area counties under the Air District's jurisdiction are summarized in Figure 8 and Table I. See Tables L-U for detailed emissions information.

Figure 8: 2011 CO2- Equivalent Emissions by County

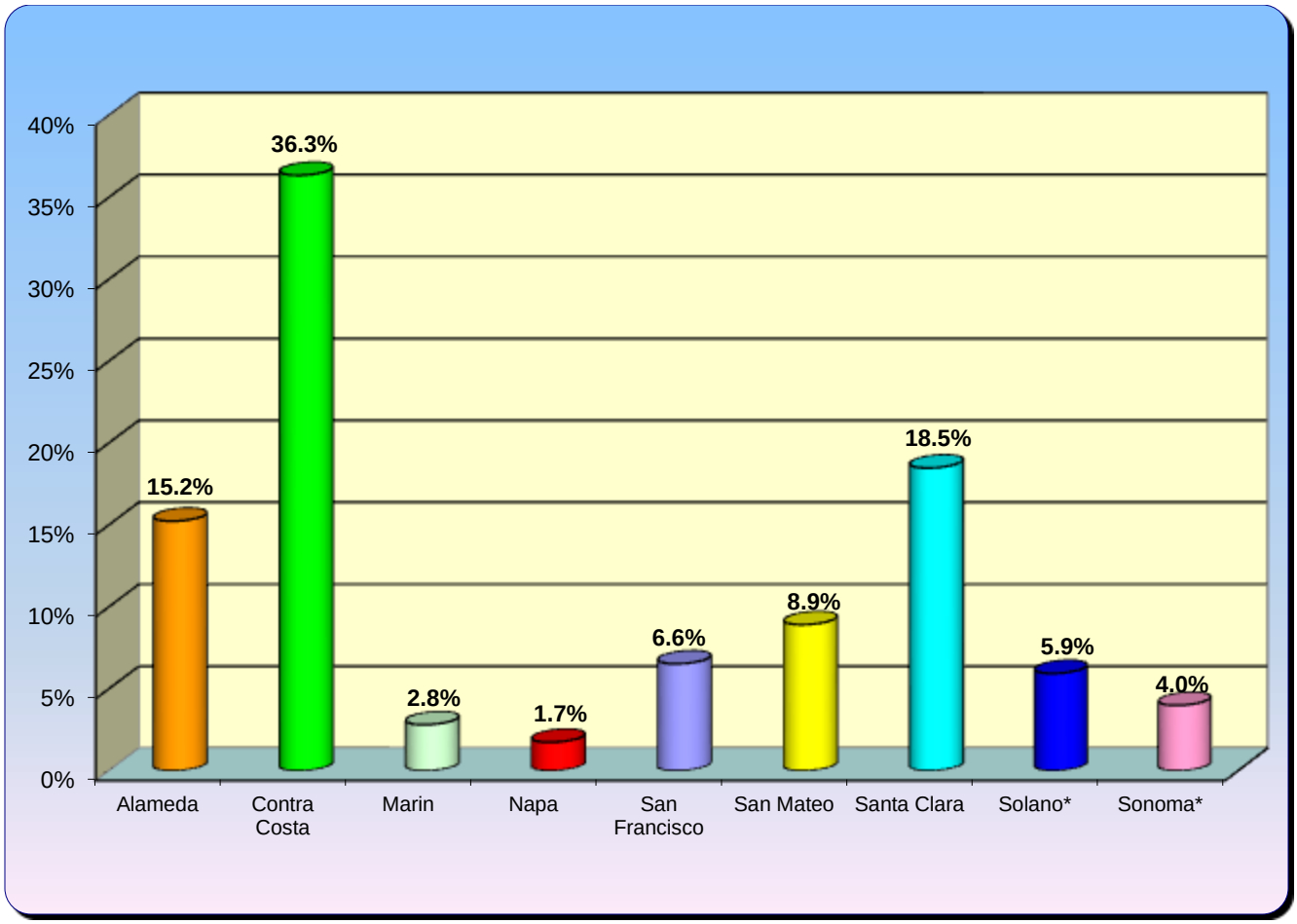


Table I: 2011 CO2- Equivalent Emissions by County

County	% of Total Emissions	CO2- Equivalent (Million Metric Tons / Year)
Alameda	15.2%	13.2
Contra Costa	36.3%	31.4
Marin	2.8%	2.4
Napa	1.7%	1.5
San Francisco	6.6%	5.7
San Mateo	8.9%	7.7
Santa Clara	18.5%	16.0
Solano*	5.9%	5.1
Sonoma*	4.0%	3.5
Total	**100%**	**86.6**

*Portion within BAAQMD

A breakdown of emissions by end-use sectors for each county is shown in Figure 9 and Table J. This figure and table show relatively higher industrial/commercial sector emissions in Contra Costa and Solano Counties due to the oil refining industry in these counties. All other counties show the largest contribution from the transportation sector.

Figure 9: 2011 County Emissions Breakdown by Sector

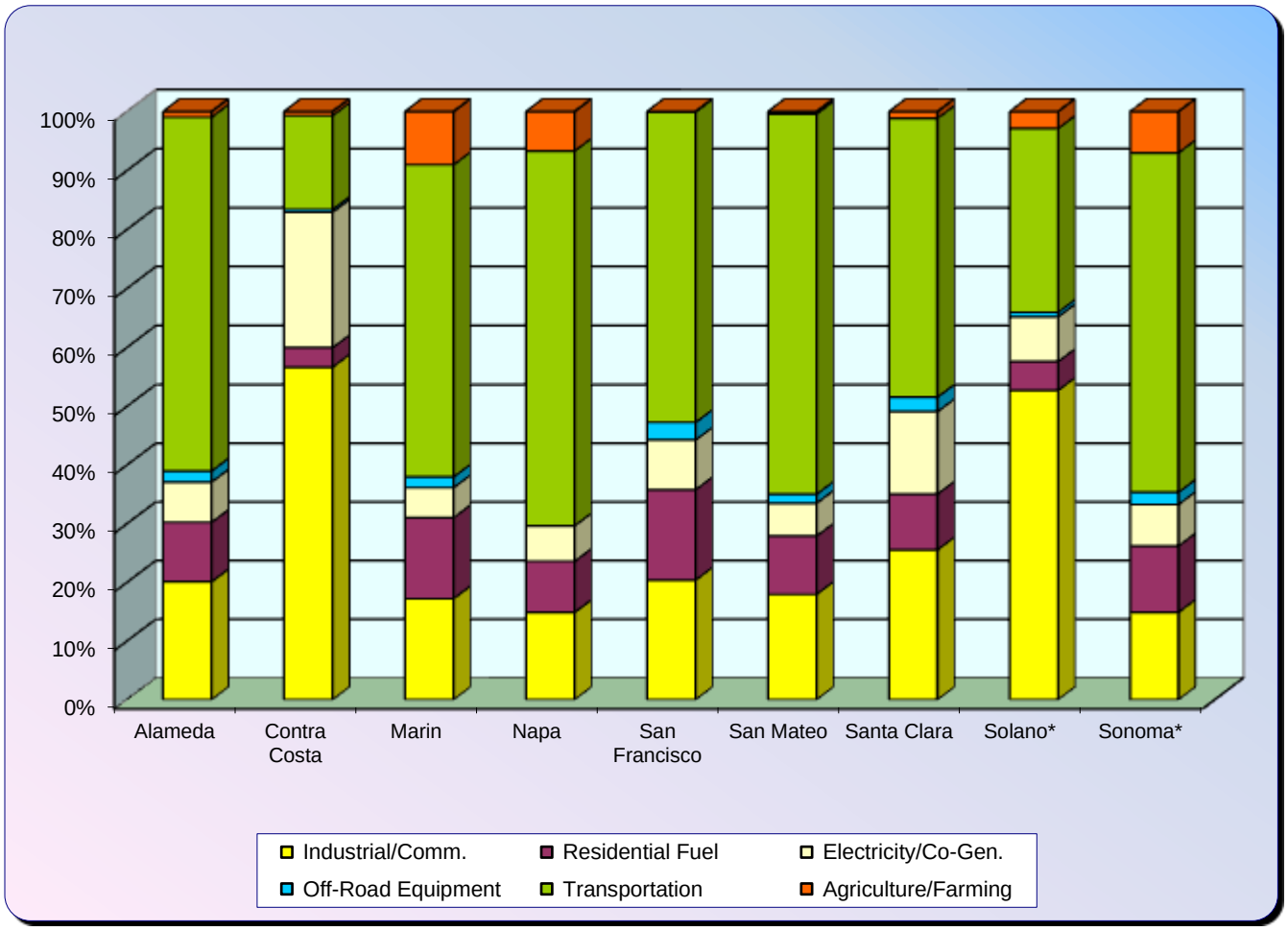


Table J: 2011 County Emissions Breakdown by Sector (Million Metric Tons CO2-Equiv./Yr.)

Sector	Alameda	Contra Costa	Marin	Napa	San Francisco	San Mateo	Santa Clara	Solano*	Sonoma*
Industrial/Comm.	2.7	17.8	0.4	0.2	1.2	1.4	4.1	2.7	0.5
Residential Fuel	1.3	1.0	0.3	0.1	0.9	0.8	1.5	0.3	0.4
Electricity/Co-Gen.	0.9	7.2	0.1	0.1	0.5	0.4	2.2	0.4	0.2
Off-Road Equipment	0.2	0.2	0.0	0.0	0.2	0.1	0.4	0.0	0.1
Transportation	7.9	5.0	1.3	0.9	3.0	5.0	7.6	1.6	2.0
Agriculture/Farming	0.1	0.2	0.2	0.1	0.0	0.0	0.2	0.1	0.2
Total	**13.2**	**31.4**	**2.4**	**1.5**	**5.7**	**7.7**	**16.0**	**5.1**	**3.5**

*Portion within BAAQMD

V. GHG Emission Trends for the Bay Area

Developing a greenhouse gas emissions inventory is an important step in establishing historical emissions trends and tracking progress towards the future emission reduction goals in the Bay Area region. Factors such as economic activity, environmental conditions such as drought, demographic influences, and the impact of regulatory efforts play an important part in year to year changes in GHG emissions.

The GHG emission trends are expected to continue in an upward trajectory assuming a "business as usual" scenario *absent policy changes,* as shown in Figures 10, 11, 13, and 14. However, efforts to achieve the climate change goals by reducing GHG emissions are taking place at the state, regional and local level in California. The California Air Resources Board and other state agencies have identified measures to achieve AB32, the California Global Warming Solutions Act of 2006, emission reduction goal of meeting statewide 1990 GHG emissions levels by 2020, and reducing emissions by 80 percent below 1990 levels by 2050. The California Air Resources Board developed the initial AB32 Scoping Plan in 2008 that describes the approach California will take to reduce the greenhouse gas emissions. Key elements of California's strategy to reduce GHG emissions are through:

- Expanding and strengthening efficiency programs in the use of energy and resources
- Reductions in greenhouse gas emissions from vehicles by the Pavley Clean Car Standards, California Assembly Bill 1493
- Increase California's power generation from renewable energy sources to at least one third of the statewide electric power mix by 2020
- Decarbonize California's fuel and energy supply
- Develop a cap-and-trade program to meet GHG emission reduction targets
- GHG reduction efforts made at the local and regional level
- Reduce our use of GHG emission-intensive goods

Many of the AB32 greenhouse gas reduction measures such as Advance Clean Car Standard, Low Carbon Fuel Standard, and Cap-and-Trade have been adopted and implementation is taking place.

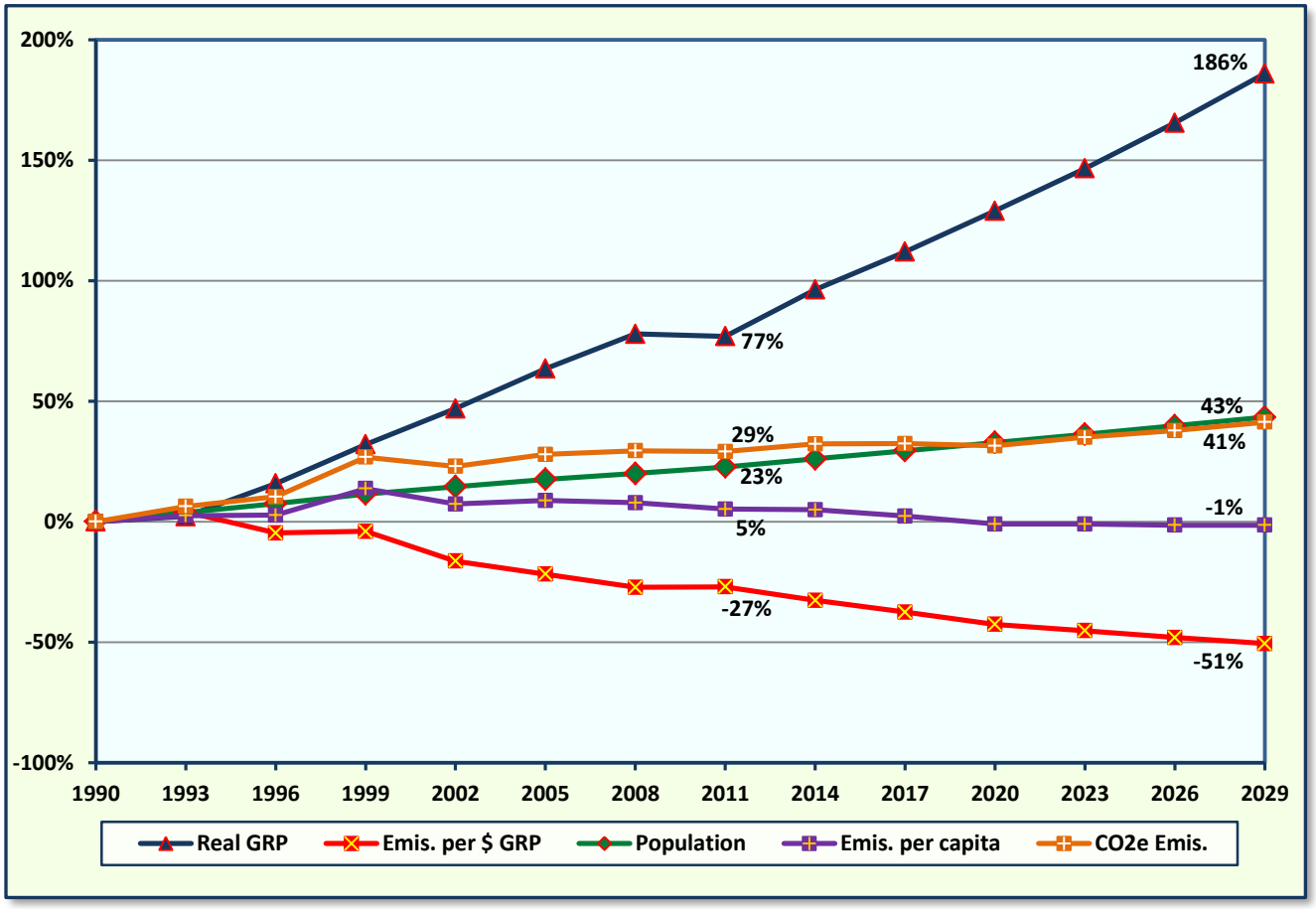
Regional and local governments and agencies are very important partners in meeting the climate protection goals due to their broad influence and in some cases, having sole authority over rules and regulations, including land use and transportation planning, zoning and urban growth decisions, industrial permitting, implementation of building codes and other standards, and control of municipal operations. At the regional level, the Bay Area Air District established a climate protection program in 2005 to explicitly acknowledge the link between climate change and air quality. In November 2013, the Air District's Board of Directors adopted a resolution outlining greenhouse gas reduction goals and making a commitment to develop a regional climate protection strategy. In

response to Senate Bill 375, the Bay Area and other major metropolitan areas in California are developing *Sustainable Communities Strategies* to integrate land use and transportation planning in order to reduce future motor vehicle travel and decrease GHG emissions. In addition, the Air District is implementing programs to install electric vehicle charging stations and jump-start the introduction of electric vehicles in the region. At the local level, Bay Area cities and counties are preparing and implementing local climate action plans. In January 2014, the California Air Pollution Control Officers Association (CAPCOA) created the Greenhouse Gas Reduction Exchange (GHG Rx) program to provide credits for GHG reduction projects in California. The GHG Rx will help accelerate local greenhouse gas reductions thus assist in meeting state, regional, and local climate goals.

The climate protection efforts described above, in combination with programs and policies to promote energy conservation and renewable energy, are expected to reduce future Bay Area GHG emissions to levels below the projections presented in this report.

As shown in Figure 10, from 1990 to 2011, San Francisco Bay Area's Gross Regional Product (GRP) increased by 77% and population grew by some 23 percent. For the same period, the GHG intensity of Bay Area's economy (emissions per unit of economic

Figure 10: Trends in GRP, Emis. per Capita, Population, Emis. per $GRP, and Total CO2e

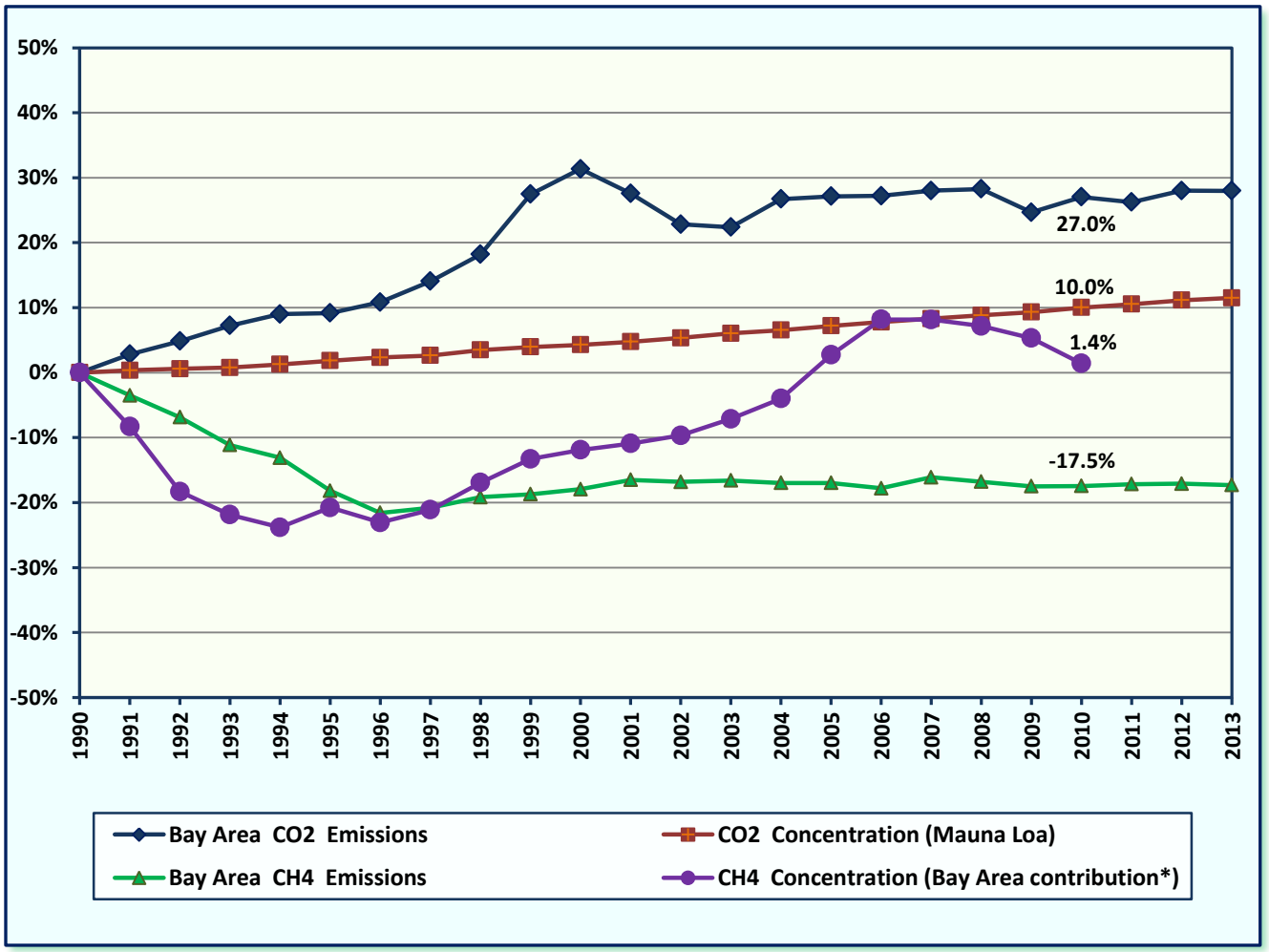


output) decreased by 27%, per capita emission rates went up by approximately 5%, and total CO_2e emissions went up by 29 percent.

Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and several other fluorine-containing halogenated substances (i.e., such as HFCs, PFCs, and SF_6) are the most important greenhouse gases directly emitted by humans. In accordance with IPCC, from the pre-industrial era (before 1750) to 2010, the concentrations of carbon dioxide, methane, and nitrous oxide have increased globally by 39, 158, and 18 percent, respectively.

Figure 11 illustrates recent carbon dioxide and methane emission and concentration trends. The methane concentration trend line in the chart shows the Bay Area's contribution. The Bay Area's contribution is calculated by subtracting mean methane concentration values at Trinidad Head, California from the Bay Area's mean methane concentrations values.

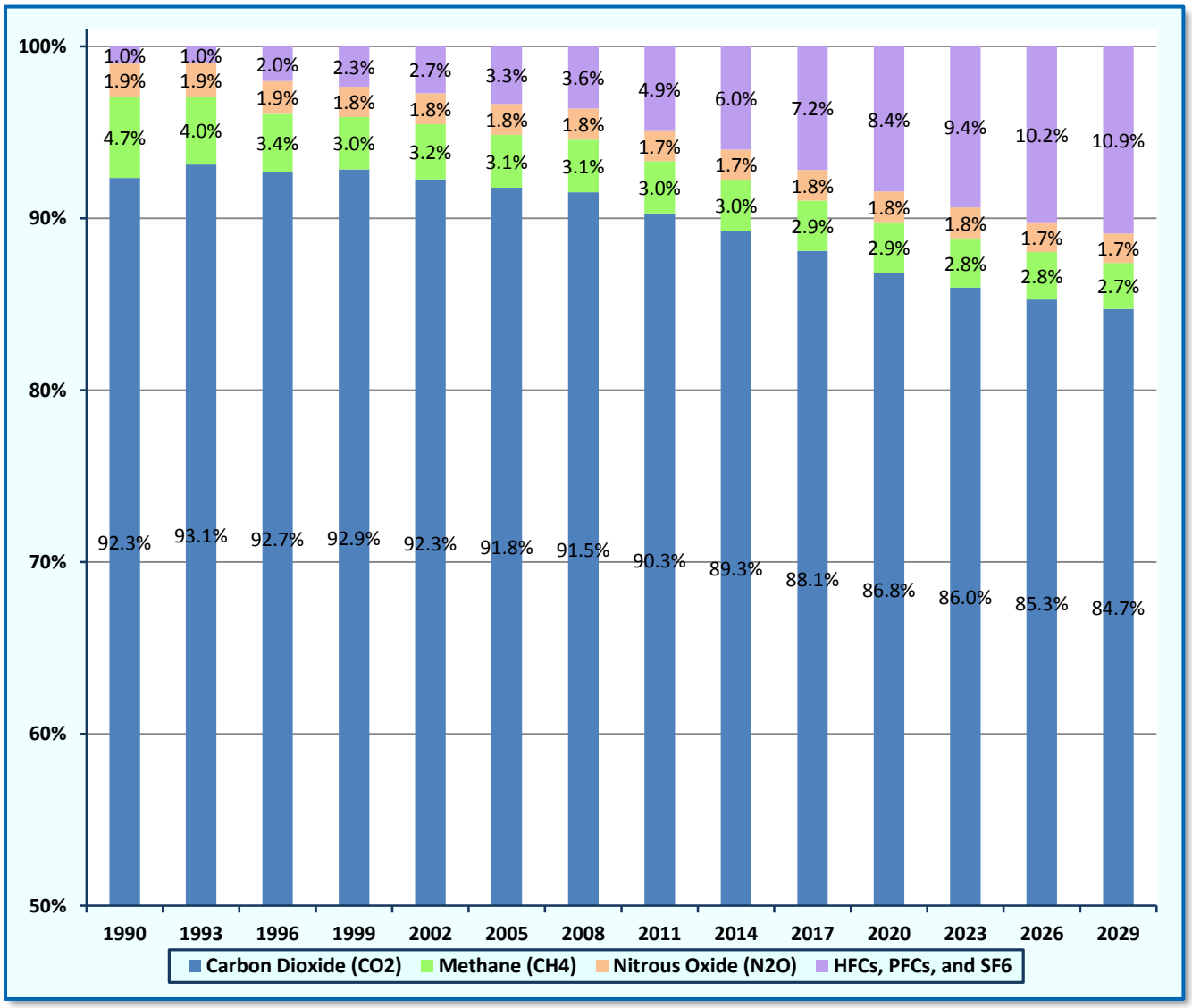
Figure 11: Carbon Dioxide (CO_2) and Methane (CH_4) Emissions and Concentrations



* Differences between Bay Area mean CH_4 concentrations and Trinidad Head CH_4 concentrations.

Figure 12 illustrates annual CO_2e emission relative contribution trends by greenhouse gas in the San Francisco Bay Area. From 1990 to 2011, emissions of high-GWP gases (HFCs, PFCs, and SF_6) have consistently increased relative to emissions of three principal GHG gases (carbon dioxide, methane, and nitrous oxide). Relative emissions of high-GWP gases increased by 3.9 percent and while emissions of carbon dioxide, methane, and nitrous oxide decreased by 2, 1.7, and 0.2 percent, respectively. Upward trend in high-GWP gas emissions is due to 1) phase-out of ozone depleting substances (ODS) (e. g., CFCs) and replaced by high-GWP gases, and, 2) large presence of Semiconductor/Electronic industry in the Bay Area, which uses high-GWP gases in its manufacturing processes. Most reductions in emissions of principal GHG gases (CO_2, CH_4, and N_2O) have been driven by economic factors, energy efficiency actions, renewable power requirements, and environmental conditions such as precipitation.

Figure 12: Annual CO2e Emission Relative Contribution Trends by Greenhouse Gas



Under "business as usual" conditions, greenhouse gas emissions are expected to grow in the future due to population growth and economic expansion. Figure 13 and Tables K and V show emissions trends by sectors for the period 1990 to 2029.

Figure 13: Bay Area GHG Emission Trends by Sector

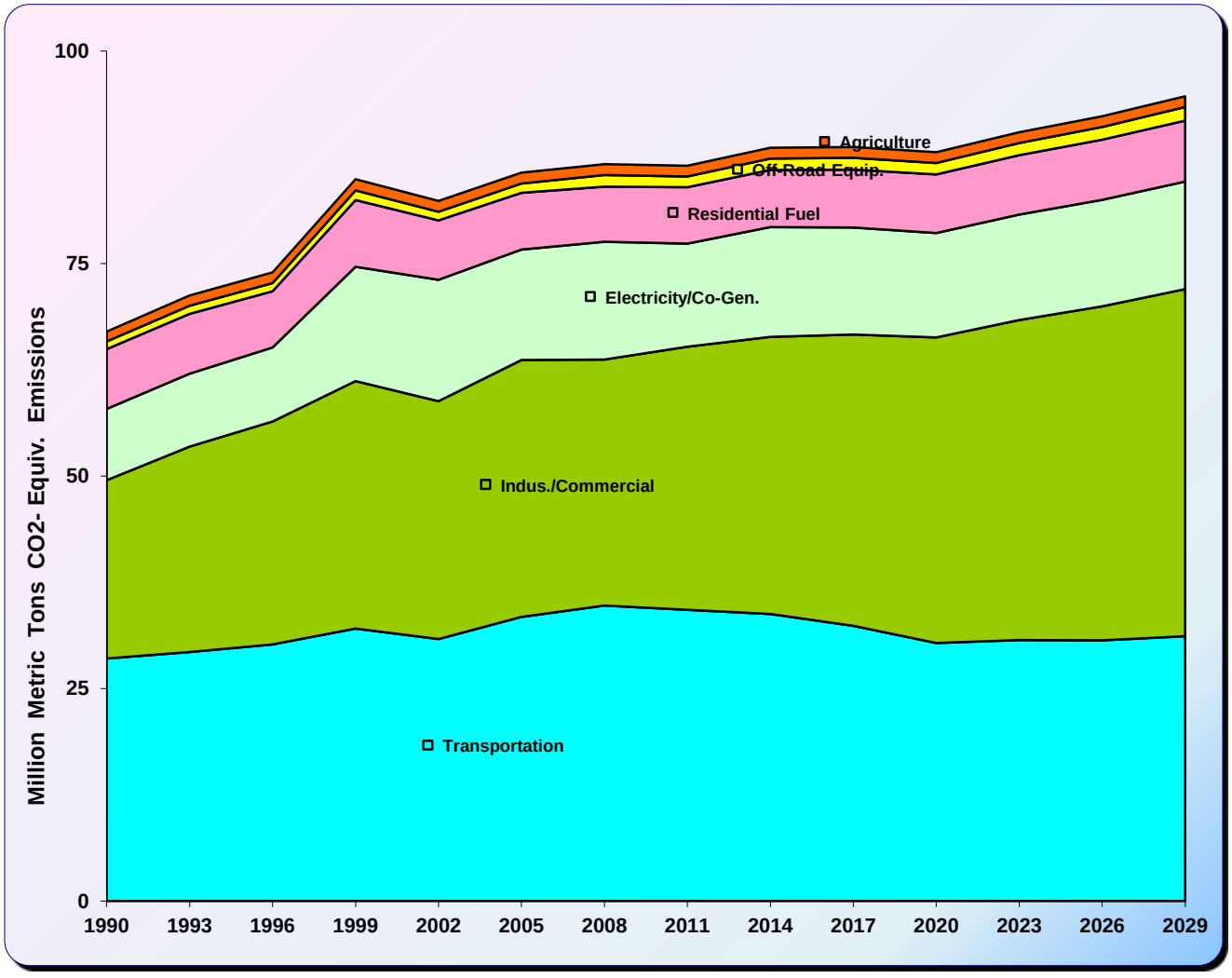


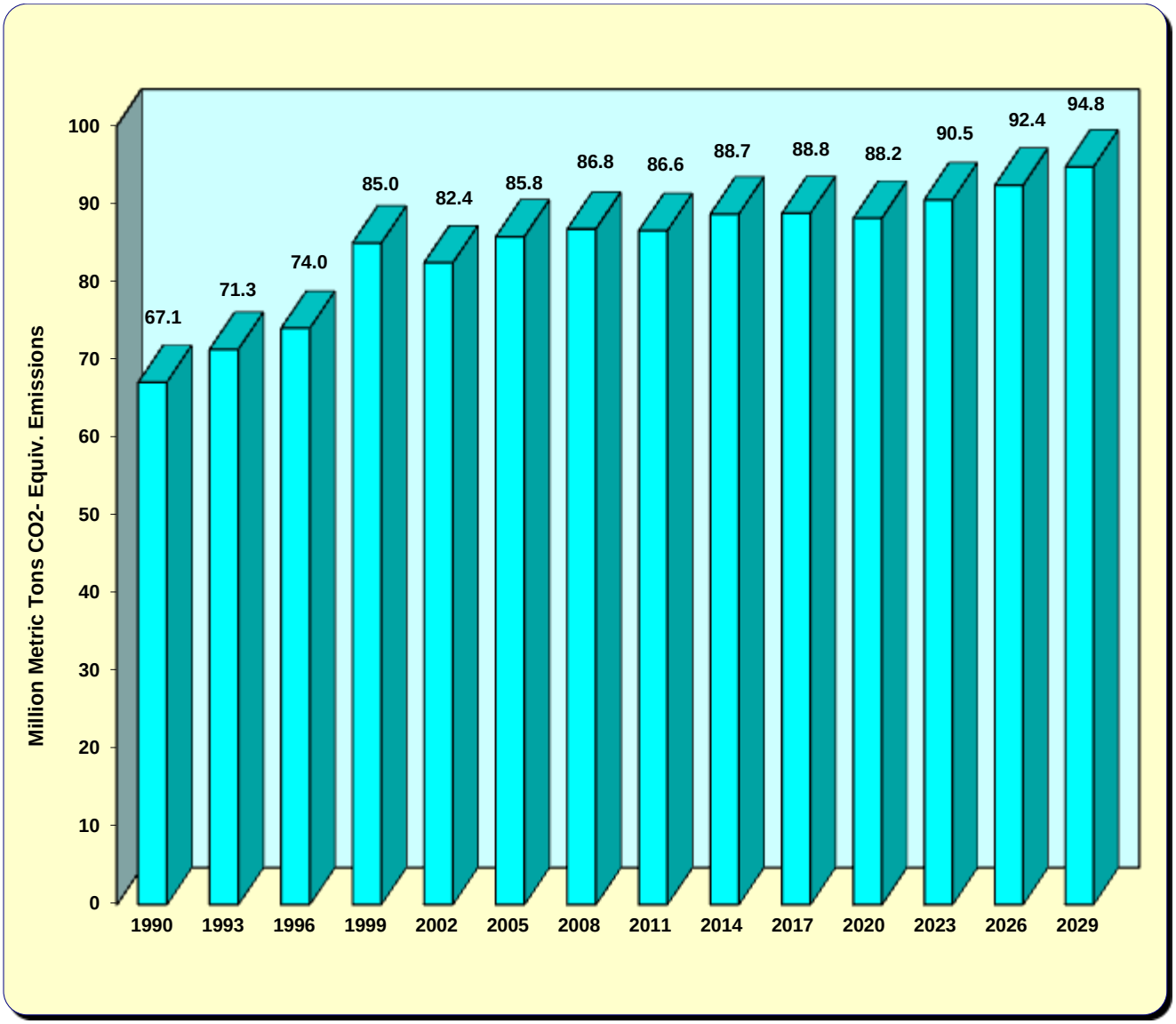
Table K: Bay Area Emissions Trends by Sector (Million Metric Tons CO2-Equiv.)*

Category	1990	1993	1996	1999	2002	2005	2008	2011	2014	2017	2020	2023	2026	2029
Transportation	28.6	29.4	30.3	32.1	30.9	33.5	34.8	34.3	33.9	32.5	30.4	30.8	30.8	31.2
Indus./Commercial	21.0	24.2	26.2	29.1	28.0	30.2	28.9	31.0	32.6	34.3	36.0	37.6	39.3	40.8
Electricity/Co-Gen.	8.4	8.6	8.7	13.5	14.3	13.0	13.9	12.1	12.9	12.6	12.3	12.4	12.5	12.7
Residential Fuel	7.0	7.0	6.6	7.9	7.0	6.7	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2
Off-Road Equip.	0.9	1.0	1.0	1.1	1.0	1.1	1.4	1.3	1.3	1.4	1.3	1.4	1.5	1.6
Agriculture	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total	67.1	71.3	74.0	85.0	82.4	85.8	86.8	86.6	88.7	88.8	88.2	90.5	92.4	94.8

* "Business as usual" projection

Figure 14 shows the Bay Area region's overall greenhouse gas emissions trends for the period 1990 to 2029. More detailed data on emissions trends is provided in Table V.

Figure 14: Bay Area Overall Emission Trends*



* "Business as usual" projection

Greenhouse gas emissions are projected based on estimated growth in various source categories. For example, CARB's EMFAC2011 and OFFROAD2007 computer models were utilized to project GHG emissions from transportation sources. In these models, fuel consumption estimates were based on the anticipated change of fleet mix and the growth of various types of on-road and off-road vehicles. Growth in VMT is based on the MTC's Regional Transportation Plan (RTP2030). For aircraft categories, the fleet mix, activity, and growth data are based on information from the Bay Area airports in combination with the Metropolitan Transportation Commission's (MTC's) Regional

Airport System Planning Analysis: 2011 Update and the Federal Aviation Administration's (FAA's) 2010 Terminal Area Forecast reports.

The projected GHG emissions from power plants are based on the California Energy Commission's (CEC's) report, The California Energy Demand 2014-2024 Forecasts, September 2013. Year-to-year fluctuation in emissions trends is due to variation in economic activity and the fraction of electric power generation in this region. Power generation in the Bay Area varies year-to-year depending on various factors including the availability of hydroelectric and other imported power.

Emission projections for the oil refineries were based on the California Energy Commission's report on California's Petroleum Infrastructure (2007).

The GHG projections from other major sources such as landfills, natural gas fuel distribution, and cement manufacturing were estimated by using the 2009 Association of Bay Area Government's employment and population data. California Integrated Waste Management data were also considered in the landfill projection process.

These projections reflect regulatory programs in place as of 2013, most notably the benefits of Pavley Regulations adopted pursuant to AB 1493. If current trends continue, Bay Area GHG emissions are expected to increase at an average rate of approximately 0.5% per year.

As mentioned earlier and shown in Figures 10, 11, 13, and 14, long-term GHG emissions trends are expected to increase assuming a "business as usual" scenario *absent policy changes*. However, it is important to note actions to reduce GHG emissions and protect the climate are occurring at the state, regional and local level in California. CARB and other state agencies have identified measures to achieve the AB32 emission reduction goal of meeting statewide 1990 GHG emissions levels by 2020. Specifically, in December 2008 CARB adopted the AB32 Scoping Plan which outlines a statewide strategy to achieve AB32 goals. At the regional level, in response to Senate Bill 375, the Bay Area and other major metropolitan areas in California have developed *Sustainable Communities Strategies* to integrate land use and transportation planning in order to reduce future motor vehicle travel and decrease GHG emissions. In addition, the Air District, in cooperation with its regional agency partners and other stakeholders, is implementing a wide range of programs that will help reduce GHG emissions and protect the climate, such as a program to install electric vehicle charging stations and jump-start the introduction of electric vehicles in the region. At the local level, Bay Area cities and counties are preparing and implementing local climate action plans. The efforts described above, in combination with programs and policies to promote energy conservation and renewable energy, are expected to reduce future Bay Area GHG emissions to levels below the projections presented here. This GHG emissions inventory

will be updated as climate protection programs are implemented and as additional information about activity data, emission factors and other inputs becomes available.

VI. Next Steps and Improvements

In effort to improve this greenhouse gas emissions inventory, the following updates are planned in the near future as supplements to this report:

Alternative Emissions Forecasting Methods

- Develop alternate GHG emission inventory forecasting methods. These alternate forecasting methods will account for reductions in GHG emissions due to efforts made at the local level in the San Francisco Bay Area region. These alternate emission forecasts will take into account the effects of ongoing, adopted, and foreseeable greenhouse gas reduction measures at the city and county levels. The current business as usual (BAU) emissions inventory back-casts and forecasts GHG emissions from 1990 to 2030. The proposed alternate forecast methods will extend the emission projections to year 2050 and consider local carbon and other GHG reduction credits.

Black Carbon Emissions Inventory

- Develop the black carbon (BC) emissions inventory for the Bay Area. Black carbon pollution has some important impacts on our climate, environment, and health. Black carbon is a short-lived climate pollutant with a larger contribution to warming relative to its concentrations and is a key ingredient in the formation of harmful air contaminants. BC is the most strongly light-absorbing component of particulate matter (PM) and contributes to climate change by directly absorbing light which leads to increased global average temperatures and accelerated snow and ice melt. BC also influences the reflectivity of earth's surface by dimming and changes in the pattern and intensity of precipitation.

Regional Forest and Urban Forest Sink Emissions Inventory

- Develop the Bay Area regional Natural and Working Lands Sector greenhouse gas emissions inventory. The natural and working lands sector was formerly known as the Forest Sector. The natural and working lands play a critical role in our region's and global carbon balance. This GHG emissions inventory is important in tracking the sequestration of atmospheric carbon dioxide by woodlands, urban forests, rangelands, scrublands, and wetlands in the Bay Area and emissions of greenhouse gases to the atmosphere through processes that occur in the forests and the wood product systems. The forests act as atmospheric carbon sinks and sources such as prescribed and wild fires, the

combustion and decomposition of agriculture and other plant residues, and wood products, act as atmospheric GHG emission generators. The natural and working lands emissions inventory also includes urban trees or urban forests which not only sequester carbon dioxide, but also provide climate benefits by shading and cooling thus lowering the urban temperatures and reducing the energy need.

Methane (CH_4) Assessments/Concentration Measurements

- Recent study has found that the methane emissions were being under estimated in the United States based current emission estimation methods. Most of the methane emissions under estimations were from the raising of livestock and the extraction of oil and natural gas. The District will conduct methane assessment and/or mitigation work in the San Francisco Bay Area to measure concentrations of methane emissions on regular basis. To achieve accurate and reliable CH_4 concentration measurements, new instrumentation will be purchased and installed at strategic locations throughout the Bay Area Air District. Also a thorough review of methane emission estimation methods will be performed and updates will be made as necessary.

All emissions related data tables in this GHG emissions inventory report are available online[9].

[9] http://www.baaqmd.gov/Divisions/Planning-and-Research/Emission-Inventory/Greenhouse-Gases.aspx

Table L:
Annual GHG Emissions: Bay Area Year 2011 (Metric Tons / Year)

SOURCE CATEGORY	CO_2	CH_4	N_2O	PFC/HFC	SF_6	Non-Biogenic CO_2-Equivalent	Biogenic CO_2
INDUSTRIAL/ COMMERCIAL							
Oil Refineries							
Refining Processes	3,702,974	79	1	--	--	3,704,945	--
Refinery Make Gas Combustion	4,218,595	86	5	--	--	4,221,954	--
Natural Gas and Other Gases Combustion	5,303,774	274	18	--	--	5,315,163	--
Liquid Fuel Combustion	79,289	1	1	--	--	79,564	--
Solid Fuel Combustion	856,787	25	5	--	--	858,861	--
Waste Management							
Landfill Combustion Sources	1,077	1,587	1	--	--	34,848	675,032
Landfill Fugitive Sources	--	61,747	3	--	--	1,297,643	161,550
Composting/POTWs	86	484	671	--	--	218,389	--
Other Industrial/ Commercial							
Cement Plants	841,678	9	2	--	--	842,462	--
Commercial Cooking	133,061	--	--	--	--	133,061	--
ODS Substitutes/Nat. Gas Distrib./Other	132,472	17,355	--	2,331	0.13	4,724,646	481
Reciprocating Engines	129,143	1,148	--	--	--	153,407	110,725
Turbines	9,542	--	--	--	--	9,573	--
Natural Gas- Major Combustion Sources	1,699,512	32	3	--	--	1,701,046	--
Natural Gas- Minor Combustion Sources	6,703,301	128	123	--	--	6,744,096	--
Other Fuels Combustion	907,754	264	2	--	--	913,825	145,187
Subtotal	24,719,047	83,219	836	2,331	0.13	30,953,483	1,092,975
RESIDENTIAL FUEL USAGE							
Natural Gas	6,348,730	122	116	--	--	6,387,367	--
LPgas/Liquid Fuel	156,622	3	10	--	--	159,830	--
Solid Fuel	--	3,697	40	--	--	89,888	377,979
Subtotal	6,505,352	3,821	166	--	--	6,637,086	377,979
ELECTRICITY/ CO-GENERATION							
Co-Generation	5,245,576	1,287	6	--	--	5,274,392	118,363
Electricity Generation	4,105,520	163	8	--	1.18	4,144,003	7,396
Electricity Imports	2,674,539	128	113	--	--	2,712,246	--
Subtotal	12,025,635	1,578	127	--	1.18	12,130,641	125,760
OFF-ROAD EQUIPMENT							
Lawn and Garden Equipment	110,037	176	74	--	--	136,525	--
Construction Equipment	408,736	58	11	--	--	413,282	--
Industrial Equipment	442,033	245	34	--	--	457,751	--
Light Commercial Equipment	239,695	89	43	--	--	254,903	--
Subtotal	1,200,501	568	161	--	--	1,262,461	--
TRANSPORTATION							
Off-Road							
Locomotives	86,622	5	35	--	--	97,498	--
Ships	591,236	65	26	--	--	600,740	--
Boats	549,077	229	60	--	--	572,440	--
Commercial Aircraft	1,765,454	91	62	--	--	1,786,456	--
General Aviation	152,030	33	6	--	--	154,424	--
Military Aircraft	178,086	24	5	--	--	180,266	--
On-Road							
Passenger Cars/Trucks up to 10,000 lbs	25,811,909	1,928	2,033	--	--	26,482,541	--
Medium/Heavy Duty Trucks > 10,000 lbs	3,522,265	98	139	--	--	3,567,343	--
Urban,School and Other Buses	742,831	22	25	--	--	750,961	--
Motor-Homes and Motorcycles	141,294	116	14	--	--	147,993	--
Subtotal	33,540,804	2,610	2,403	--	--	34,340,669	--
AGRICULTURE/ FARMING							
Agricultural Equipment	180,355	27	2	--	--	181,644	--
Animal Waste	--	33,514	270	--	--	787,391	--
Soil Management	7,459	--	900	--	--	286,379	56,931
Biomass Burning	--	167	10	--	--	6,750	2,090
Subtotal	187,815	33,709	1,182	--	--	1,262,165	59,021
GRAND TOTAL EMISSIONS	**78,179,155**	**125,504**	**4,876**	**2,331**	**1.3**	**86,586,599**	**1,655,735**

Table M:

Annual GHG Emissions: ALAMEDA Year 2011 (Metric Tons / Year)

SOURCE CATEGORY	CO_2	CH_4	N_2O	PFC/HFC	SF_6	Non-Biogenic CO2-Equivalent	Biogenic CO_2
INDUSTRIAL/ COMMERCIAL							
Oil Refineries							
Refining Processes	--	--	--	--	--	--	--
Refinery Make Gas Combustion	--	--	--	--	--	--	--
Natural Gas and Other Gases Combustion	219	--	--	--	--	220	--
Liquid Fuel Combustion	--	--	--	--	--	--	--
Solid Fuel Combustion	--	--	--	--	--	--	--
Waste Management							
Landfill Combustion Sources	137	473	--	--	--	10,231	255,111
Landfill Fugitive Sources	--	18,198	1	--	--	382,440	46,767
Composting/POTWs	27	178	212	--	--	69,622	--
Other Industrial/ Commercial							
Cement Plants	--	--	--	--	--	--	--
Commercial Cooking	28,236	--	--	--	--	28,236	--
ODS Substitutes/Nat. Gas Distrib./Other	102	1,965	--	544	0.13	1,043,481	268
Reciprocating Engines	9,055	21	--	--	--	9,515	1,891
Turbines	2,914	--	--	--	--	2,924	--
Natural Gas- Major Combustion Sources	349,785	10	1	--	--	350,195	--
Natural Gas- Minor Combustion Sources	730,660	14	13	--	--	735,106	--
Other Fuels Combustion	17,293	57	--	--	--	18,547	20,577
Subtotal	1,138,427	20,917	228	544	0.13	2,650,517	324,614
RESIDENTIAL FUEL USAGE							
Natural Gas	1,293,871	25	24	--	--	1,301,745	--
LPgas/Liquid Fuel	22,663	--	1	--	--	23,129	--
Solid Fuel	--	420	4	--	--	10,207	43,697
Subtotal	1,316,534	445	30	--	--	1,335,080	43,697
ELECTRICITY/ CO-GENERATION							
Co-Generation	119,399	460	--	--	--	129,150	66,302
Electricity Generation	41,128	--	--	--	0.26	48,081	--
Electricity Imports	716,777	34	30	--	--	726,882	--
Subtotal	877,304	494	31	--	0.26	904,113	66,302
OFF-ROAD EQUIPMENT							
Lawn and Garden Equipment	24,492	39	16	--	--	30,387	--
Construction Equipment	82,636	12	2	--	--	83,561	--
Industrial Equipment	79,272	43	6	--	--	81,961	--
Light Commercial Equipment	49,373	18	9	--	--	52,450	--
Subtotal	235,772	112	33	--	--	248,360	--
TRANSPORTATION							
Off-Road							
Locomotives	24,554	1	10	--	--	27,637	--
Ships	48,460	5	2	--	--	49,231	--
Boats	38,546	18	5	--	--	40,456	--
Commercial Aircraft	302,680	13	11	--	--	306,208	--
General Aviation	38,908	7	1	--	--	39,482	--
Military Aircraft	4,321	--	--	--	--	4,337	--
On-Road							
Passenger Cars/Trucks up to 10,000 lbs	5,697,972	438	449	--	--	5,846,286	--
Medium/Heavy Duty Trucks > 10,000 lbs	1,385,820	33	48	--	--	1,401,355	--
Urban,School and Other Buses	171,428	4	5	--	--	173,102	--
Motor-Homes and Motorcycles	26,941	22	3	--	--	28,239	--
Subtotal	7,739,628	542	533	--	--	7,916,334	--
AGRICULTURE/ FARMING							
Agricultural Equipment	15,186	2	--	--	--	15,294	--
Animal Waste	--	3,705	52	--	--	94,021	--
Soil Management	1,009	--	40	--	--	13,355	1,504
Biomass Burning	--	31	2	--	--	1,167	153
Subtotal	16,195	3,739	94	--	--	123,837	1,657
GRAND TOTAL EMISSIONS	**11,323,861**	**26,248**	**949**	**544**	**0.4**	**13,178,240**	**436,270**

Table N:

Annual GHG Emissions: CONTRA COSTA Year 2011 (Metric Tons / Year)

SOURCE CATEGORY	CO_2	CH_4	N_2O	PFC/HFC	SF_6	Non-Biogenic CO2-Equivalent	Biogenic CO_2
INDUSTRIAL/ COMMERCIAL							
Oil Refineries							
Refining Processes	3,216,457	78	1	--	--	3,218,390	--
Refinery Make Gas Combustion	3,260,386	66	4	--	--	3,262,953	--
Natural Gas and Other Gases Combustion	4,969,696	261	18	--	--	4,980,626	--
Liquid Fuel Combustion	79,289	1	1	--	--	79,564	--
Solid Fuel Combustion	856,787	25	5	--	--	858,861	--
Waste Management							
Landfill Combustion Sources	40	259	--	--	--	5,521	75,511
Landfill Fugitive Sources	--	7,988	--	--	--	167,872	20,637
Composting/POTWs	1	20	20	--	--	6,758	--
Other Industrial/ Commercial							
Cement Plants	--	--	--	--	--	--	--
Commercial Cooking	14,130	--	--	--	--	14,130	--
ODS Substitutes/Nat. Gas Distrib./Other	131,839	7,251	--	295	--	820,349	39
Reciprocating Engines	41,272	525	--	--	--	52,334	35,865
Turbines	4	--	--	--	--	4	--
Natural Gas- Major Combustion Sources	526,312	10	1	--	--	526,710	--
Natural Gas- Minor Combustion Sources	2,929,342	56	54	--	--	2,947,170	--
Other Fuels Combustion	873,793	37	1	--	--	874,771	50,161
Subtotal	16,899,345	16,575	104	295	--	17,816,013	182,213
RESIDENTIAL FUEL USAGE							
Natural Gas	991,037	19	18	--	--	997,068	--
LPgas/Liquid Fuel	17,758	--	1	--	--	18,135	--
Solid Fuel	--	986	11	--	--	23,972	99,835
Subtotal	1,008,795	1,005	30	--	--	1,039,175	99,835
ELECTRICITY/ CO-GENERATION							
Co-Generation	4,093,994	201	4	--	--	4,099,596	--
Electricity Generation	3,112,049	103	8	--	0.17	3,121,411	216
Electricity Imports	--	--	--	--	--	--	--
Subtotal	7,206,044	304	12	--	0.17	7,221,007	216
OFF-ROAD EQUIPMENT							
Lawn and Garden Equipment	16,691	27	11	--	--	20,709	--
Construction Equipment	69,348	10	2	--	--	70,099	--
Industrial Equipment	33,424	17	2	--	--	34,398	--
Light Commercial Equipment	26,752	10	5	--	--	28,502	--
Subtotal	146,215	63	20	--	--	153,708	--
TRANSPORTATION							
Off-Road							
Locomotives	24,037	1	10	--	--	27,055	--
Ships	24,271	3	1	--	--	24,662	--
Boats	64,899	37	12	--	--	69,345	--
Commercial Aircraft	--	--	--	--	--	--	--
General Aviation	13,821	10	--	--	--	14,162	--
Military Aircraft	--	--	--	--	--	--	--
On-Road	--	--	--	--	--	--	
Passenger Cars/Trucks up to 10,000 lbs	4,195,423	307	329	--	--	4,303,736	--
Medium/Heavy Duty Trucks > 10,000 lbs	451,243	12	18	--	--	456,945	--
Urban,School and Other Buses	75,522	2	3	--	--	76,596	--
Motor-Homes and Motorcycles	25,316	18	3	--	--	26,494	--
Subtotal	4,874,531	391	375	--	--	4,998,997	--
AGRICULTURE/ FARMING							
Agricultural Equipment	18,973	3	--	--	--	19,109	--
Animal Waste	--	5,564	44	--	--	130,522	--
Soil Management	811	--	204	--	--	63,906	624
Biomass Burning	--	10	1	--	--	377	63
Subtotal	19,784	5,577	248	--	--	213,915	688
GRAND TOTAL EMISSIONS	**30,154,725**	**23,916**	**790**	**295**	**0.17**	**31,442,828**	**282,952**

Table O:

Annual GHG Emissions: MARIN Year 2011 (Metric Tons / Year)

SOURCE CATEGORY	CO_2	CH_4	N_2O	PFC/HFC	SF_6	Non-Biogenic CO2-Equivalent	Biogenic CO_2
INDUSTRIAL/ COMMERCIAL							
Oil Refineries							
Refining Processes	--	--	--	--	--	--	--
Refinery Make Gas Combustion	--	--	--	--	--	--	--
Natural Gas and Other Gases Combustion	--	--	--	--	--	--	--
Liquid Fuel Combustion	--	--	--	--	--	--	--
Solid Fuel Combustion	--	--	--	--	--	--	--
Waste Management							
Landfill Combustion Sources	12	9	--	--	--	244	66,018
Landfill Fugitive Sources	--	5,482	--	--	--	115,214	14,532
Composting/POTWs	--	14	18	--	--	5,883	--
Other Industrial/ Commercial							
Cement Plants	--	--	--	--	--	--	--
Commercial Cooking	4,669	--	--	--	--	4,669	--
ODS Substitutes/Nat. Gas Distrib./Other	72	344	--	82	--	153,751	17
Reciprocating Engines	1,533	--	--	--	--	1,540	--
Turbines	3	--	--	--	--	3	--
Natural Gas- Major Combustion Sources	29,025	--	--	--	--	29,045	--
Natural Gas- Minor Combustion Sources	107,253	2	2	--	--	107,906	--
Other Fuels Combustion	604	8	--	--	--	767	2,165
Subtotal	143,171	5,860	20	82	--	419,020	82,732
RESIDENTIAL FUEL USAGE							
Natural Gas	311,723	6	6	--	--	313,620	--
LPgas/Liquid Fuel	13,468	--	1	--	--	13,750	--
Solid Fuel	--	342	4	--	--	8,313	34,514
Subtotal	325,191	348	10	--	--	335,683	34,514
ELECTRICITY/ CO-GENERATION							
Co-Generation	3,000	41	--	--	--	3,863	3,350
Electricity Generation	--	--	--	--	0.04	1,139	--
Electricity Imports	117,680	6	5	--	--	119,339	--
Subtotal	120,679	47	5	--	0.04	124,342	3,350
OFF-ROAD EQUIPMENT							
Lawn and Garden Equipment	6,514	10	4	--	--	8,081	--
Construction Equipment	15,172	2	--	--	--	15,342	--
Industrial Equipment	7,382	4	--	--	--	7,588	--
Light Commercial Equipment	12,379	4	2	--	--	13,158	--
Subtotal	41,447	21	7	--	--	44,169	--
TRANSPORTATION							
Off-Road							
Locomotives	716	--	--	--	--	806	--
Ships	82,025	9	4	--	--	83,344	--
Boats	51,090	41	7	--	--	54,086	--
Commercial Aircraft	--	--	--	--	--	--	--
General Aviation	12,323	2	--	--	--	12,506	--
Military Aircraft	--	--	--	--	--	--	--
On-Road							
Passenger Cars/Trucks up to 10,000 lbs	975,754	70	76	--	--	1,000,673	--
Medium/Heavy Duty Trucks > 10,000 lbs	78,584	3	4	--	--	79,770	--
Urban,School and Other Buses	59,317	1	2	--	--	59,806	--
Motor-Homes and Motorcycles	5,570	5	1	--	--	5,839	--
Subtotal	1,265,379	131	93	--	--	1,296,831	--
AGRICULTURE/ FARMING							
Agricultural Equipment	7,340	1	--	--	--	7,393	--
Animal Waste	--	8,880	45	--	--	200,274	--
Soil Management	692	--	34	--	--	11,171	3
Biomass Burning	--	9	--	--	--	352	83
Subtotal	8,033	8,890	79	--	--	219,190	86
GRAND TOTAL EMISSIONS	**1,903,899**	**15,297**	**215**	**82**	**0.04**	**2,439,233**	**120,683**

Table P:

Annual GHG Emissions: NAPA Year 2011 (Metric Tons / Year)

SOURCE CATEGORY	CO_2	CH_4	N_2O	PFC/HFC	SF_6	Non-Biogenic CO2-Equivalent	Biogenic CO_2
INDUSTRIAL/ COMMERCIAL							
Oil Refineries							
Refining Processes	--	--	--	--	--	--	--
Refinery Make Gas Combustion	--	--	--	--	--	--	--
Natural Gas and Other Gases Combustion	--	--	--	--	--	--	--
Liquid Fuel Combustion	--	--	--	--	--	--	--
Solid Fuel Combustion	--	--	--	--	--	--	--
Waste Management							
Landfill Combustion Sources	68	29	--	--	--	692	13,796
Landfill Fugitive Sources	--	1,251	--	--	--	26,288	3,383
Composting/POTWs	--	9	18	--	--	5,618	--
Other Industrial/ Commercial							
Cement Plants	--	--	--	--	--	--	--
Commercial Cooking	2,228	--	--	--	--	2,228	--
ODS Substitutes/Nat. Gas Distrib./Other	--	189	--	46	--	86,424	10
Reciprocating Engines	1,527	62	--	--	--	2,846	9,639
Turbines	--	--	--	--	--	--	--
Natural Gas- Major Combustion Sources	35,722	1	--	--	--	35,755	--
Natural Gas- Minor Combustion Sources	60,330	1	1	--	--	60,697	--
Other Fuels Combustion	51	11	--	--	--	300	5,965
Subtotal	99,925	1,553	19	46	--	220,848	32,793
RESIDENTIAL FUEL USAGE							
Natural Gas	118,721	2	2	--	--	119,444	--
LPgas/Liquid Fuel	5,976	--	--	--	--	6,102	--
Solid Fuel	--	163	2	--	--	3,951	16,410
Subtotal	124,697	165	4	--	--	129,497	16,410
ELECTRICITY/ CO-GENERATION							
Co-Generation	5,708	--	--	--	--	5,720	--
Electricity Generation	7,571	1	--	--	0.02	8,202	--
Electricity Imports	74,887	4	3	--	--	75,943	--
Subtotal	88,166	5	3	--	0.02	89,865	--
OFF-ROAD EQUIPMENT							
Lawn and Garden Equipment	2,344	4	2	--	--	2,908	--
Construction Equipment	7,236	1	--	--	--	7,317	--
Industrial Equipment	6,791	3	--	--	--	6,987	--
Light Commercial Equipment	4,432	2	1	--	--	4,783	--
Subtotal	20,803	10	3	--	--	21,995	--
TRANSPORTATION							
Off-Road							
Locomotives	4,298	--	2	--	--	4,838	--
Ships	--	--	--	--	--	--	--
Boats	27,833	24	7	--	--	30,378	--
Commercial Aircraft	--	--	--	--	--	--	--
General Aviation	9,789	2	--	--	--	9,935	--
Military Aircraft	--	--	--	--	--	--	--
On-Road							
Passenger Cars/Trucks up to 10,000 lbs	766,782	65	62	--	--	787,347	--
Medium/Heavy Duty Trucks > 10,000 lbs	93,596	3	4	--	--	94,951	--
Urban,School and Other Buses	11,661	--	1	--	--	11,826	--
Motor-Homes and Motorcycles	5,771	4	1	--	--	6,038	--
Subtotal	919,728	98	76	--	--	945,313	--
AGRICULTURE/ FARMING							
Agricultural Equipment	31,833	5	--	--	--	32,060	--
Animal Waste	--	1,387	21	--	--	35,541	--
Soil Management	1,662	--	93	--	--	30,368	3,046
Biomass Burning	--	31	2	--	--	1,310	421
Subtotal	33,495	1,423	116	--	--	99,279	3,467
GRAND TOTAL EMISSIONS	**1,286,814**	**3,254**	**221**	**46**	**0.02**	**1,506,795**	**52,669**

Table Q:

Annual GHG Emissions: SAN FRANCISCO Year 2011 (Metric Tons / Year)

SOURCE CATEGORY	CO_2	CH_4	N_2O	PFC/HFC	SF_6	Non-Biogenic CO2-Equivalent	Biogenic CO_2
INDUSTRIAL/ COMMERCIAL							
Oil Refineries							
Refining Processes	--	--	--	--	--	--	--
Refinery Make Gas Combustion	--	--	--	--	--	--	--
Natural Gas and Other Gases Combustion	--	--	--	--	--	--	--
Liquid Fuel Combustion	--	--	--	--	--	--	--
Solid Fuel Combustion	--	--	--	--	--	--	--
Waste Management							
Landfill Combustion Sources	--	--	--	--	--	--	--
Landfill Fugitive Sources	--	138	--	--	--	2,894	462
Composting/POTWs	--	58	67	--	--	21,934	--
Other Industrial/ Commercial							
Cement Plants	--	--	--	--	--	--	--
Commercial Cooking	27,432	--	--	--	--	27,432	--
ODS Substitutes/Nat. Gas Distrib./Other	--	1,431	--	278	--	530,093	--
Reciprocating Engines	13,557	56	--	--	--	14,749	1
Turbines	6,527	--	--	--	--	6,548	--
Natural Gas- Major Combustion Sources	201,792	3	--	--	--	201,965	--
Natural Gas- Minor Combustion Sources	341,868	7	6	--	--	343,949	--
Other Fuels Combustion	371	82	--	--	--	2,159	23,715
Subtotal	591,547	1,775	74	278	--	1,151,723	24,177
RESIDENTIAL FUEL USAGE							
Natural Gas	841,207	16	15	--	--	846,326	--
LPgas/Liquid Fuel	21,749	--	1	--	--	22,145	--
Solid Fuel	--	62	1	--	--	1,510	7,264
Subtotal	862,956	78	17	--	--	869,981	7,264
ELECTRICITY/ CO-GENERATION							
Co-Generation	161,925	64	--	--	--	163,297	3,869
Electricity Generation	103	--	--	--	0.14	3,684	--
Electricity Imports	307,572	15	13	--	--	311,908	--
Subtotal	469,600	79	13	--	0.14	478,889	3,869
OFF-ROAD EQUIPMENT							
Lawn and Garden Equipment	11,707	19	8	--	--	14,525	--
Construction Equipment	66,961	9	2	--	--	67,700	--
Industrial Equipment	39,433	22	3	--	--	40,804	--
Light Commercial Equipment	43,800	16	8	--	--	46,463	--
Subtotal	161,901	65	20	--	--	169,491	--
TRANSPORTATION							
Off-Road							
Locomotives	2,149	--	1	--	--	2,419	--
Ships	277,608	31	12	--	--	282,072	--
Boats	267,957	45	14	--	--	273,305	--
Commercial Aircraft	--	--	--	--	--	--	--
General Aviation	--	--	--	--	--	--	--
Military Aircraft	--	--	--	--	--	--	--
On-Road							
Passenger Cars/Trucks up to 10,000 lbs	2,076,953	148	152	--	--	2,127,330	--
Medium/Heavy Duty Trucks > 10,000 lbs	172,799	6	9	--	--	175,740	--
Urban,School and Other Buses	167,392	5	4	--	--	168,835	--
Motor-Homes and Motorcycles	9,248	12	1	--	--	9,690	--
Subtotal	2,974,106	247	194	--	--	3,039,390	--
AGRICULTURE/ FARMING							
Agricultural Equipment	108	--	--	--	--	109	--
Animal Waste	--	183	--	--	--	3,846	--
Soil Management	8	--	1	--	--	236	1,057
Biomass Burning	--	--	--	--	--	16	2
Subtotal	116	184	1	--	--	4,207	1,059
GRAND TOTAL EMISSIONS	**5,060,228**	**2,429**	**319**	**278**	**0.14**	**5,713,685**	**36,369**

Table R:

Annual GHG Emissions: SAN MATEO Year 2011 (Metric Tons / Year)

SOURCE CATEGORY	CO_2	CH_4	N_2O	PFC/HFC	SF_6	Non-Biogenic CO2-Equivalent	Biogenic CO_2
INDUSTRIAL/ COMMERCIAL							
Oil Refineries							
Refining Processes	--	--	--	--	--	--	--
Refinery Make Gas Combustion	--	--	--	--	--	--	--
Natural Gas and Other Gases Combustion	--	--	--	--	--	--	--
Liquid Fuel Combustion	--	--	--	--	--	--	--
Solid Fuel Combustion	--	--	--	--	--	--	--
Waste Management							
Landfill Combustion Sources	--	42	--	--	--	901	19,894
Landfill Fugitive Sources	--	8,566	--	--	--	180,024	23,454
Composting/POTWs	--	42	48	--	--	15,732	--
Other Industrial/ Commercial							
Cement Plants	--	--	--	--	--	--	--
Commercial Cooking	13,583	--	--	--	--	13,583	--
ODS Substitutes/Nat. Gas Distrib./Other	107	1,067	--	262	--	493,486	40
Reciprocating Engines	16,970	46	--	--	--	17,961	15,773
Turbines	16	--	--	--	--	16	--
Natural Gas- Major Combustion Sources	79,934	1	--	--	--	80,006	--
Natural Gas- Minor Combustion Sources	576,484	11	11	--	--	579,992	--
Other Fuels Combustion	2,824	44	--	--	--	3,785	14,246
Subtotal	689,918	9,820	59	262	--	1,385,487	73,407
RESIDENTIAL FUEL USAGE							
Natural Gas	738,357	14	14	--	--	742,851	--
LPgas/Liquid Fuel	17,933	--	1	--	--	18,305	--
Solid Fuel	--	222	2	--	--	5,405	23,039
Subtotal	756,290	237	17	--	--	766,561	23,039
ELECTRICITY/ CO-GENERATION							
Co-Generation	29,509	25	--	--	--	30,052	2,244
Electricity Generation	--	--	--	--	0.12	3,256	--
Electricity Imports	393,157	19	17	--	--	398,700	--
Subtotal	422,667	44	17	--	0.12	432,008	2,244
OFF-ROAD EQUIPMENT							
Lawn and Garden Equipment	11,663	19	8	--	--	14,470	--
Construction Equipment	39,751	6	1	--	--	40,198	--
Industrial Equipment	33,533	18	2	--	--	34,683	--
Light Commercial Equipment	27,211	10	5	--	--	28,928	--
Subtotal	112,158	53	16	--	--	118,280	--
TRANSPORTATION							
Off-Road							
Locomotives	4,298	--	2	--	--	4,838	--
Ships	157,232	17	7	--	--	159,764	--
Boats	49,222	19	4	--	--	50,766	--
Commercial Aircraft	1,290,995	73	46	--	--	1,306,808	--
General Aviation	18,607	3	1	--	--	18,887	--
Military Aircraft	4,802	--	--	--	--	4,824	--
On-Road							
Passenger Cars/Trucks up to 10,000 lbs	3,057,516	222	246	--	--	3,138,364	--
Medium/Heavy Duty Trucks > 10,000 lbs	193,317	7	10	--	--	196,701	--
Urban,School and Other Buses	95,406	2	3	--	--	96,398	--
Motor-Homes and Motorcycles	12,650	13	1	--	--	13,255	--
Subtotal	4,884,048	357	320	--	--	4,990,604	--
AGRICULTURE/ FARMING							
Agricultural Equipment	9,054	1	--	--	--	9,118	--
Animal Waste	--	473	9	--	--	12,652	--
Soil Management	346	--	30	--	--	9,515	176
Biomass Burning	--	14	1	--	--	554	214
Subtotal	9,400	488	39	--	--	31,839	389
GRAND TOTAL EMISSIONS	**6,874,481**	**10,999**	**468**	**262**	**0.12**	**7,724,786**	**99,080**

Table S:

Annual GHG Emissions: SANTA CLARA Year 2011 (Metric Tons / Year)

SOURCE CATEGORY	CO_2	CH_4	N_2O	PFC/HFC	SF_6	Non-Biogenic CO2-Equivalent	Biogenic CO_2
INDUSTRIAL/ COMMERCIAL							
Oil Refineries							
Refining Processes	--	--	--	--	--	--	--
Refinery Make Gas Combustion	--	--	--	--	--	--	--
Natural Gas and Other Gases Combustion	--	--	--	--	--	--	--
Liquid Fuel Combustion	--	--	--	--	--	--	--
Solid Fuel Combustion	--	--	--	--	--	--	--
Waste Management							
Landfill Combustion Sources	104	439	--	--	--	9,439	168,911
Landfill Fugitive Sources	--	14,716	1	--	--	309,272	38,221
Composting/POTWs	4	132	239	--	--	76,711	--
Other Industrial/ Commercial							
Cement Plants	841,678	9	2	--	--	842,462	--
Commercial Cooking	31,093	--	--	--	--	31,093	--
ODS Substitutes/Nat. Gas Distrib./Other	199	3,790	--	615	--	1,193,660	36
Reciprocating Engines	19,091	302	--	--	--	25,487	47,556
Turbines	79	--	--	--	--	79	--
Natural Gas- Major Combustion Sources	320,512	5	1	--	--	320,801	--
Natural Gas- Minor Combustion Sources	1,260,220	24	23	--	--	1,267,890	--
Other Fuels Combustion	6,754	15	--	--	--	7,173	20,509
Subtotal	2,479,734	19,433	266	615	--	4,084,067	275,233
RESIDENTIAL FUEL USAGE							
Natural Gas	1,453,224	28	27	--	--	1,462,069	--
LPgas/Liquid Fuel	38,280	1	2	--	--	39,066	--
Solid Fuel	--	737	8	--	--	17,931	75,657
Subtotal	1,491,504	766	37	--	--	1,519,066	75,657
ELECTRICITY/ CO-GENERATION							
Co-Generation	460,349	369	1	--	--	468,353	33,616
Electricity Generation	925,524	59	--	--	0.30	934,909	7,180
Electricity Imports	831,782	40	35	--	--	843,509	--
Subtotal	2,217,654	468	36	--	0.30	2,246,771	40,797
OFF-ROAD EQUIPMENT							
Lawn and Garden Equipment	27,066	43	18	--	--	33,582	--
Construction Equipment	84,856	12	2	--	--	85,808	--
Industrial Equipment	207,124	123	18	--	--	215,315	--
Light Commercial Equipment	55,619	21	10	--	--	59,154	--
Subtotal	374,665	199	48	--	--	393,860	--
TRANSPORTATION							
Off-Road							
Locomotives	15,825	1	6	--	--	17,812	--
Ships	--	--	--	--	--	--	--
Boats	19,064	9	4	--	--	20,587	--
Commercial Aircraft	171,779	5	5	--	--	173,440	--
General Aviation	41,566	7	2	--	--	42,182	--
Military Aircraft	21,181	16	1	--	--	21,735	--
On-Road							
Passenger Cars/Trucks up to 10,000 lbs	6,197,106	455	496	--	--	6,360,510	--
Medium/Heavy Duty Trucks > 10,000 lbs	782,645	21	30	--	--	792,460	--
Urban,School and Other Buses	92,684	3	4	--	--	93,938	--
Motor-Homes and Motorcycles	33,890	25	3	--	--	35,493	--
Subtotal	7,375,744	542	552	--	--	7,558,156	--
AGRICULTURE/ FARMING							
Agricultural Equipment	35,025	5	--	--	--	35,275	--
Animal Waste	--	2,918	44	--	--	74,875	--
Soil Management	685	--	225	--	--	70,330	1,213
Biomass Burning	--	17	1	--	--	736	385
Subtotal	35,709	2,940	270	--	--	181,216	1,598
GRAND TOTAL EMISSIONS	**13,975,006**	**24,348**	**1,209**	**615**	**0.30**	**15,983,145**	**393,286**

Table T:
Annual GHG Emissions: SOLANO* Year 2011 (Metric Tons / Year)

SOURCE CATEGORY	CO_2	CH_4	N_2O	PFC/HFC	SF_6	Non-Biogenic CO2-Equivalent	Biogenic CO_2
INDUSTRIAL/ COMMERCIAL							
Oil Refineries							
Refining Processes	486,518	2	--	--	--	486,556	--
Refinery Make Gas Combustion	958,209	20	1	--	--	959,002	--
Natural Gas and Other Gases Combustion	333,858	13	1	--	--	334,318	--
Liquid Fuel Combustion	--	--	--	--	--	--	--
Solid Fuel Combustion	--	--	--	--	--	--	--
Waste Management							
Landfill Combustion Sources	--	75	--	--	--	1,592	35,181
Landfill Fugitive Sources	--	2,470	--	--	--	51,903	6,419
Composting/POTWs	53	10	15	--	--	4,846	--
Other Industrial/ Commercial							
Cement Plants	--	--	--	--	--	--	--
Commercial Cooking	4,231	--	--	--	--	4,231	--
ODS Substitutes/Nat. Gas Distrib./Other	6	904	--	78	--	158,283	14
Reciprocating Engines	23,345	134	--	--	--	26,173	--
Turbines	--	--	--	--	--	--	--
Natural Gas- Major Combustion Sources	122,601	2	--	--	--	122,708	--
Natural Gas- Minor Combustion Sources	556,374	11	10	--	--	559,760	--
Other Fuels Combustion	1,294	6	--	--	--	1,426	2,954
Subtotal	2,486,489	3,646	27	78	--	2,710,800	44,568
RESIDENTIAL FUEL USAGE							
Natural Gas	242,521	5	4	--	--	243,997	--
LPgas/Liquid Fuel	3,561	--	--	--	--	3,637	--
Solid Fuel	--	158	2	--	--	3,840	16,257
Subtotal	246,083	163	6	--	--	251,474	16,257
ELECTRICITY/ CO-GENERATION							
Co-Generation	367,266	50	--	--	--	368,335	3,592
Electricity Generation	19,143	--	--	--	0.05	21,105	--
Electricity Imports	--	--	--	--	--	--	--
Subtotal	386,409	51	--	--	0.05	389,440	3,592
OFF-ROAD EQUIPMENT							
Lawn and Garden Equipment	3,169	5	2	--	--	3,932	--
Construction Equipment	15,743	2	--	--	--	15,919	--
Industrial Equipment	13,318	5	1	--	--	13,570	--
Light Commercial Equipment	6,724	3	1	--	--	7,166	--
Subtotal	38,953	14	4	--	--	40,587	--
TRANSPORTATION							
Off-Road							
Locomotives	5,731	--	2	--	--	6,450	--
Ships	1,640	--	--	--	--	1,666	--
Boats	12,727	20	3	--	--	14,139	--
Commercial Aircraft	--	--	--	--	--	--	--
General Aviation	--	--	--	--	--	--	--
Military Aircraft	147,783	8	5	--	--	149,369	--
On-Road							
Passenger Cars/Trucks up to 10,000 lbs	1,150,690	84	90	--	--	1,180,260	--
Medium/Heavy Duty Trucks > 10,000 lbs	205,084	5	7	--	--	207,490	--
Urban,School and Other Buses	34,172	1	1	--	--	34,610	--
Motor-Homes and Motorcycles	8,245	6	1	--	--	8,639	--
Subtotal	1,566,070	123	110	--	--	1,602,623	--
AGRICULTURE/ FARMING							
Agricultural Equipment	31,418	5	--	--	--	31,643	--
Animal Waste	--	2,218	19	--	--	52,371	--
Soil Management	854	--	197	--	--	61,971	47,286
Biomass Burning	--	40	2	--	--	1,489	255
Subtotal	32,272	2,262	218	--	--	147,474	47,542
GRAND TOTAL EMISSIONS	**4,756,281**	**6,259**	**366**	**78**	**0.05**	**5,142,400**	**111,958**

* Portion within District Boundaries

Table U:
Annual GHG Emissions: SONOMA* Year 2011 (Metric Tons / Year)

SOURCE CATEGORY	CO_2	CH_4	N_2O	PFC/HFC	SF_6	Non-Biogenic CO2-Equivalent	Biogenic CO_2
INDUSTRIAL/ COMMERCIAL							
Oil Refineries							
Refining Processes	--	--	--	--	--	--	--
Refinery Make Gas Combustion	--	--	--	--	--	--	--
Natural Gas and Other Gases Combustion	--	--	--	--	--	--	--
Liquid Fuel Combustion	--	--	--	--	--	--	--
Solid Fuel Combustion	--	--	--	--	--	--	--
Waste Management							
Landfill Combustion Sources	715	261	--	--	--	6,228	40,610
Landfill Fugitive Sources	--	2,938	--	--	--	61,736	7,675
Composting/POTWs	--	20	35	--	--	11,284	--
Other Industrial/ Commercial							
Cement Plants	--	--	--	--	--	--	--
Commercial Cooking	7,459	--	--	--	--	7,459	--
ODS Substitutes/Nat. Gas Distrib./Other	147	413	--	131	--	245,119	57
Reciprocating Engines	2,793	--	--	--	--	2,802	1
Turbines	--	--	--	--	--	--	--
Natural Gas- Major Combustion Sources	33,831	1	--	--	--	33,862	--
Natural Gas- Minor Combustion Sources	140,769	3	3	--	--	141,626	--
Other Fuels Combustion	4,771	4	--	--	--	4,896	4,895
Subtotal	190,486	3,640	38	131	--	515,013	53,238
RESIDENTIAL FUEL USAGE							
Natural Gas	358,068	7	7	--	--	360,248	--
LPgas/Liquid Fuel	15,234	--	1	--	--	15,560	--
Solid Fuel	--	607	6	--	--	14,761	61,306
Subtotal	373,303	614	14	--	--	390,569	61,306
ELECTRICITY/ CO-GENERATION							
Co-Generation	4,426	76	--	--	--	6,025	5,389
Electricity Generation	2	--	--	--	0.08	2,216	--
Electricity Imports	232,685	11	10	--	--	235,965	--
Subtotal	237,114	87	10	--	0.08	244,206	5,389
OFF-ROAD EQUIPMENT							
Lawn and Garden Equipment	6,393	10	4	--	--	7,931	--
Construction Equipment	27,033	4	1	--	--	27,337	--
Industrial Equipment	21,757	11	1	--	--	22,445	--
Light Commercial Equipment	13,405	5	3	--	--	14,298	--
Subtotal	68,588	30	9	--	--	72,012	--
TRANSPORTATION							
Off-Road							
Locomotives	5,014	--	2	--	--	5,644	--
Ships	--	--	--	--	--	--	--
Boats	17,738	16	4	--	--	19,377	--
Commercial Aircraft	--	--	--	--	--	--	--
General Aviation	17,016	3	1	--	--	17,269	--
Military Aircraft	--	--	--	--	--	--	--
On-Road							
Passenger Cars/Trucks up to 10,000 lbs	1,693,715	138	134	--	--	1,738,058	--
Medium/Heavy Duty Trucks > 10,000 lbs	159,176	6	8	--	--	161,838	--
Urban,School and Other Buses	35,248	1	2	--	--	35,772	--
Motor-Homes and Motorcycles	13,663	9	1	--	--	14,285	--
Subtotal	1,941,570	173	152	--	--	1,992,243	--
AGRICULTURE/ FARMING							
Agricultural Equipment	31,418	5	--	--	--	31,642	--
Animal Waste	--	8,187	37	--	--	183,289	--
Soil Management	1,393	--	78	--	--	25,527	2,023
Biomass Burning	--	14	1	--	--	750	513
Subtotal	32,811	8,206	116	--	--	241,208	2,536
GRAND TOTAL EMISSIONS	**2,843,869**	**12,751**	**339**	**131**	**0.08**	**3,455,250**	**122,469**

* Portion within District Boundaries

Table V: Bay Area Greenhouse Gas Emission Inventory Projections : 1990 - 2029

(Million Metric Tons CO_2- Equivalent)

SOURCE CATEGORY	Year 1990	1993	1996	1999	2002	2005	2008	2011	2014	2017	2020	2023	2026	2029
INDUSTRIAL/ COMMERCIAL														
Oil Refineries														
Refining Processes	4.2	4.3	4.5	4.7	4.0	3.5	3.6	3.7	3.8	3.9	4.1	4.2	4.3	4.4
Refinery Make Gas Combustion	3.2	3.4	3.1	3.7	3.9	4.0	4.1	4.2	4.4	4.5	4.6	4.8	4.9	5.0
Natural Gas and Other Gases Combustion	4.8	4.6	4.8	4.7	4.9	5.0	5.2	5.3	5.5	5.6	5.8	6.0	6.2	6.4
Liquid Fuel Combustion	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Solid Fuel Combustion	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0
Waste Management														
Landfill Combustion Sources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Landfill Fugitive Sources	1.8	1.4	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2
Composting/POTWs	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
Other Industrial/ Commercial														
Cement Plants	0.8	0.6	0.7	0.7	0.6	0.7	0.4	0.8	0.9	0.9	1.0	1.1	1.1	1.2
Commercial Cooking	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
ODS Substitutes/Nat. Gas Distrib./Other	0.9	1.0	1.8	2.4	2.8	3.3	3.9	4.7	5.8	6.8	7.9	9.0	9.9	10.8
Reciprocating Engines	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Turbines	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Gas- Major Combustion Sources	2.2	2.0	1.8	2.1	1.8	1.6	2.4	1.7	1.7	1.7	1.7	1.6	1.6	1.6
Natural Gas- Minor Combustion Sources	1.7	5.3	7.0	8.1	7.2	8.9	6.3	6.7	6.9	7.0	7.1	7.2	7.3	7.4
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Fuels Combustion	0.1	0.1	0.1	0.1	0.3	0.3	0.4	0.9	0.9	0.9	1.0	1.0	1.0	1.1
Subtotal	21.0	24.2	26.2	29.1	28.0	30.2	28.9	31.0	32.6	34.3	36.0	37.6	39.3	40.8
RESIDENTIAL FUEL USAGE														
Natural Gas	6.7	6.7	6.3	7.6	6.7	6.4	6.2	6.4	6.5	6.6	6.7	6.7	6.8	6.9
LPgas/Liquid Fuel	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Solid Fuel	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Subtotal	7.0	7.0	6.6	7.9	7.0	6.7	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2
ELECTRICITY/ CO-GENERATION														
Co-Generation	2.3	1.9	2.9	3.7	3.6	5.6	5.4	5.3	5.4	5.6	5.8	5.9	6.1	6.3
Electricity Generation	1.6	2.1	1.7	5.4	5.9	3.8	4.1	4.1	4.5	4.4	4.3	4.2	4.1	4.0
Electricity Imports	4.5	4.5	4.1	4.4	4.8	3.6	4.4	2.7	2.9	2.6	2.2	2.2	2.3	2.3
Subtotal	8.4	8.6	8.7	13.5	14.3	13.0	13.9	12.1	12.9	12.6	12.3	12.4	12.5	12.7

Table V: Bay Area Greenhouse Gas Emission Inventory Projections : 1990 - 2029

(Million Metric Tons CO_2- Equivalent)

SOURCE CATEGORY	Year 1990	1993	1996	1999	2002	2005	2008	2011	2014	2017	2020	2023	2026	2029
OFF-ROAD EQUIPMENT														
Lawn and Garden Equipment	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Construction Equipment	0.2	0.3	0.3	0.4	0.2	0.3	0.6	0.4	0.4	0.5	0.4	0.4	0.5	0.5
Industrial Equipment	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.7
Light Commercial Equipment	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Subtotal	0.9	1.0	1.0	1.1	1.0	1.1	1.4	1.3	1.3	1.4	1.3	1.4	1.5	1.6
TRANSPORTATION														
Off-Road														
Locomotives	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Ships	0.4	0.5	0.5	0.5	0.6	0.7	0.6	0.6	0.6	0.7	0.8	0.8	0.9	1.0
Boats	0.5	0.5	0.5	0.5	0.5	0.4	0.6	0.6	0.6	0.6	0.3	0.7	0.4	0.4
Commercial Aircraft	1.8	1.9	2.0	2.1	1.8	1.8	1.9	1.8	2.0	2.2	2.3	2.5	2.7	2.8
General Aviation	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Military Aircraft	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.3
On-Road														
Passenger Cars/Trucks up to 10,000 lbs	21.4	22.0	22.5	23.8	23.1	25.7	26.8	26.5	25.2	23.3	21.4	21.0	20.7	20.7
Medium/Heavy Duty Trucks > 10,000 lbs	2.9	3.0	3.2	3.6	3.4	3.6	3.7	3.6	4.0	4.2	4.2	4.4	4.7	5.0
Urban,School and Other Buses	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7
Motor-Homes and Motorcycles	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Subtotal	28.6	29.4	30.3	32.1	30.9	33.5	34.8	34.3	33.9	32.5	30.4	30.8	30.8	31.2
AGRICULTURE/ FARMING														
Agricultural Equipment	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Animal Waste	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Soil Management	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Biomass Burning	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
GRAND TOTAL EMISSIONS	**67.1**	**71.3**	**74.0**	**85.0**	**82.4**	**85.8**	**86.8**	**86.6**	**88.7**	**88.8**	**88.2**	**90.5**	**92.4**	**94.8**

Table X:

2011 BAY AREA MAJOR (TOP 200) GHG EMITTING FACILITIES

Updated January 2015

No.	Plant #	Plant Name	Plant Address	City	Zipcode	CO2 Equivalent Emissions (Metric Tons per year)		
						Biogenic	Non-Biogenic	Total
1	11	Shell Martinez Refinery	3485 Pacheco Blvd	Martinez	94553	-	**4,466,533**	**4,466,533**
2	10	Chevron Products Company	841 Chevron Way	Richmond	94802	-	**4,373,627**	**4,373,627**
3	14628	Tesoro Refining & Marketing Company LLC	150 Solano Way, Avon Refinery	Martinez	94553	-	**3,030,360**	**3,030,360**
4	12626	Valero Refining Company - California	3400 E 2nd Street	Benicia	94510	-	**2,186,096**	**2,186,096**
5	12095	Delta Energy Center	Arcy Lane	Pittsburg	94565	-	**1,507,351**	**1,507,351**
6	21359	Phillips 66 Company - San Francisco Refinery	1380 San Pablo Ave	Rodeo	94572	-	**1,445,947**	**1,445,947**
7	11866	Los Medanos Energy Center	750 E 3rd Street	Pittsburg	94565	-	**1,124,087**	**1,124,087**
8	17419	Air Liquide Large Industries US LP	1380 San Pablo Ave	Rodeo	94572	-	**1,102,879**	**1,102,879**
9	18143	Gateway Generating Station	3225 Wilbur Avenue	Antioch	94509	-	**1,030,585**	**1,030,585**
10	17	Lehigh Southwest Cement Company	24001 Stevens Creek Blvd	Cupertino	95014	-	**843,948**	**843,948**
11	8664	Crockett Cogeneration	550 Loring Avenue	Crockett	94525	-	**821,600**	**821,600**
12	12183	Metcalf Energy Center	One Blanchard Road	Coyote	95013	-	**636,659**	**636,659**
13	1820	Martinez Cogen Limited Partnership	550 Solano Way, Avon Refinery	Martinez	94553	-	**420,898**	**420,898**
14	10295	Air Products & Chemicals, Inc	Tesoro, Avon Refinery	Martinez	94553	-	**372,595**	**372,595**
15	2066	Waste Management of Alameda County	10840 Altamont Pass Rd	Livermore	94551	**144,527**	**199,280**	**343,806**
16	15128	Cardinal Cogen Inc	Campus & Jordan Way	Palo Alto	94305	-	**233,977**	**233,977**
17	3246	GWF Power Systems,LP (Site 5)	555 Nichols Road	Pittsburg	94565	-	**207,819**	**207,819**
18	3244	GWF Power Systems,LP (Site 2)	1600 Loveridge Road	Pittsburg	94565	-	**195,531**	**195,531**
19	14991	Donald Von Raesfeld Power Plant	850 Duane Avenue	Santa Clara	95054	-	**190,533**	**190,533**
20	3981	GWF Power Systems,LP (Site 4)	3400 Wilbur Avenue	Antioch	94509	-	**189,249**	**189,249**
21	1179	Redwood Landfill Inc	8950 Redwood Hwy	Novato	94948	**77,694**	**97,560**	**175,254**
22	3245	GWF Power Systems,LP (Site 3)	1900 Wilbur Avenue	Antioch	94509	-	**170,446**	**170,446**
23	3243	GWF Power Systems,LP (Site 1)	895 E 3rd Street	Pittsburg	94565	-	**166,523**	**166,523**
24	2266	Browning-Ferris Industries of CA, Inc	12310 San Mateo Road	Half Moon Bay	94019	**18,019**	**140,306**	**158,325**
25	5095	Republic Services Vasco Road, LLC	4001 N Vasco Road	Livermore	94550	**74,117**	**79,508**	**153,626**
26	9013	International Disposal Corp. of California	1601 W Dixon Landing Rd	Milpitas	95035	**50,636**	**99,672**	**150,308**
27	21360	Phillips 66 Carbon Plant	2101 Franklin Canyon Rd	Rodeo	94572	-	**145,972**	**145,972**
28	2246	Tri-Cities Recycling	7010 Auto Mall Pkwy	Fremont	94538	**56,922**	**67,856**	**124,778**
29	11326	PE Berkeley, Inc	Univ of Calif, Berkeley Campus	Berkeley	94720	-	**124,208**	**124,208**

Table X:

2011 BAY AREA MAJOR (TOP 200) GHG EMITTING FACILITIES

Updated January 2015

No.	Plant #	Plant Name	Plant Address	City	Zipcode	CO2 Equivalent Emissions (Metric Tons per year)		
						Biogenic	Non-Biogenic	Total
30	1840	West Contra Costa County Landfill	1 Parr Boulevard	Richmond	94801	**56,850**	**65,689**	**122,539**
31	51	United Airlines, Inc	800 So Airport Boulevard	San Francisco	94128	**-**	**114,906**	**114,906**
32	19441	Graphic Packaging International, Inc	2600 De La Cruz Blvd	Santa Clara	95050	**-**	**114,876**	**114,876**
33	2254	Sonoma County Department of Public Works	500 Mecham Road	Petaluma	94952	**47,208**	**60,496**	**107,704**
34	4618	Keller Canyon Landfill Company	901 Bailey Road	Pittsburg	94565	**34,091**	**72,063**	**106,154**
35	11180	Calpine Gilroy Cogen, LP & Gilroy Energy Center LL	1400 Pacheco Pass Hwy	Gilroy	95020	**-**	**102,518**	**102,518**
36	1812	Kirby Canyon Recycling and Disposal Facility	910 Coyote Creek, Golf Drive	Morgan Hill	95037	**42,316**	**56,072**	**98,387**
37	2039	Potrero Hills Landfill, Inc	3675 Potrero Hills Lane	Suisun City	94585	**40,830**	**48,942**	**89,772**
38	6044	O L S Energy-Agnews	3530 Zanker Road	San Jose	95134	**-**	**87,240**	**87,240**
39	2740	City of Mountain View (Shoreline Landfill)	2600 Shoreline Boulevard	Mountain View	94043	**50,092**	**35,857**	**85,949**
40	31	Dow Chemical Company	901 Loveridge Road	Pittsburg	94565	**-**	**85,479**	**85,479**
41	591	East Bay Municipal Utility District	2020 Wake Avenue	Oakland	94607	**59,933**	**8,803**	**68,736**
42	16151	NRG Energy Center LLC	465 Stevenson Street	San Francisco	94103	**-**	**62,809**	**62,809**
43	606	Anheuser-Busch LLC	3101 Busch Drive	Fairfield	94533	**47,244**	**15,068**	**62,312**
44	907	Central Contra Costa Sanitary District	5019 Imhoff Place	Martinez	94553	**36,782**	**24,945**	**61,727**
45	778	San Jose/Santa Clara Water Pollution Control	700 Los Esteros Road	San Jose	95134	**39,602**	**19,198**	**58,800**
46	2478	UCSF/Parnassus	3rd Avenue & Parnassus	San Francisco	94122	**-**	**58,042**	**58,042**
47	18	GenOn Delta LLC	3201 Wilbur Avenue	Antioch	94509	**-**	**56,833**	**56,833**
48	3294	Guadalupe Rubbish Disposal	15999 Guadalupe Mines Rd	San Jose	95120	**15,578**	**41,079**	**56,657**
49	2371	USS-POSCO Industries	900 Loveridge Road	Pittsburg	94565	**-**	**56,109**	**56,109**
50	621	City of Santa Clara	560 Robert Avenue	Santa Clara	95050	**-**	**40,167**	**40,167**
51	1364	Cypress Amloc Land Co , Inc	1 Sand Hill Road	Colma	94014	**17,974**	**21,427**	**39,401**
52	3921	Seagate Technology, LLC	47010 Kato Road	Fremont	94538	**-**	**38,777**	**38,777**
53	30	Owens-Brockway Glass Container Inc	3600 Alameda Avenue	Oakland	94601	**-**	**36,992**	**36,992**
54	13289	Los Esteros Critical Energy Facility	800 Thomas Foon Chew Way	San Jose	95134	**-**	**35,743**	**35,743**
55	13566	Recology Pacheco Pass	Bloomfield Rd & Highway 152	Gilroy	95021	**14,368**	**17,127**	**31,495**
56	85	Hitachi Global Storage Technologies Inc	5601 Great Oaks Pkwy	San Jose	95119	**-**	**29,895**	**29,895**
57	83	United States Pipe & Foundry Company, LLC	1295 Whipple Road	Union City	94587	**-**	**28,062**	**28,062**
58	7265	San Jose State University (Cogen Plant)	10th & San Carlos St	San Jose	95192	**-**	**27,951**	**27,951**
59	19931	K2 Pure Solutions Nocal, LP	950 Loveridge Road	Pittsburg	94565	**-**	**27,792**	**27,792**

Table X:

2011 BAY AREA MAJOR (TOP 200) GHG EMITTING FACILITIES

Updated January 2015

						CO2 Equivalent Emissions (Metric Tons per year)		
No.	**Plant #**	**Plant Name**	**Plant Address**	**City**	**Zipcode**	**Biogenic**	**Non-Biogenic**	**Total**
60	3011	IPT SRI Cogeneration Inc	333 Ravenswood Drive	Menlo Park	94025	-	26,022	26,022
61	12	GenOn Delta LLC, Pittsburg Generating Station	696 W 10th Street	Pittsburg	94565	-	24,688	24,688
62	12728	Waste Management Inc	2615 Davis Street	San Leandro	94577	13,960	10,342	24,302
63	11247	Clover Flat Resource & Recovery Park	4380 Silverado Trail	Calistoga	94515	13,953	10,222	24,175
64	1257	Genentech, Inc	460 Point San Bruno Boulevard	South San Franc	94080	-	23,309	23,309
65	13193	Valero Benicia Asphalt Plant	3001 Park Road	Benicia	94510	-	22,853	22,853
66	11668	Gas Recovery Systems, Inc	Marsh Road	Menlo Park	94025	11,022	11,771	22,793
67	1190	Evergreen Oil, Inc	6880 Smith Avenue	Newark	94560	-	22,088	22,088
68	3974	San Francisco General Hospital	1001 Potrero Ave, Bldg 10, Rm 1118	San Francisco	94110	-	21,512	21,512
69	55	Lockheed Martin Corporation	1111 Lockheed Martin Way	Sunnyvale	94089	-	21,251	21,251
70	1464	Acme Fill Corporation	950 Waterbird Way	Martinez	94553	2,602	18,044	20,646
71	706	New NGC, Inc	1040 Canal Boulevard	Richmond	94804	-	18,860	18,860
72	62	A B & I Foundry	7825 San Leandro St	Oakland	94621	-	17,838	17,838
73	173	Georgia Pacific Gypsum	801 Minaker Street	Antioch	94509	-	17,830	17,830
74	94	Cargill Salt	7220 Central Ave	Newark	94560	-	17,474	17,474
75	2721	City of Palo Alto Landfill	Byxbee Park	Palo Alto	94301	4,942	12,509	17,450
76	617	Palo Alto Regional Water Quality Control Plant	2501 Embarcadero Way	Palo Alto	94303	11,966	4,466	16,432
77	15544	Kaiser Permanente	1150 Veterans Boulevard	Redwood City	94063	-	15,776	15,776
78	151	Momentive Specialty Chemicals, Inc	41100 Boyce Road	Fremont	94538	-	15,696	15,696
79	13631	Morgan Advanced Ceramics	2425 Whipple Road	Hayward	94544	-	15,550	15,550
80	9029	Kie-Con Inc	3551 Wilbur Avenue	Antioch	94509	-	15,472	15,472
81	17657	Lodi Gas Storage LLC	Kirby Hills	Suisun City	94585	-	14,754	14,754
82	733	City of Sunnyvale Water Pollution Control	1440 Borregas Avenue	Sunnyvale	94089	10,235	3,788	14,022
83	541	Pacific Gas & Electric Co	4690 Evora Road	Concord	94520	-	13,929	13,929
84	12071	Bayer Healthcare LLC	800 Dwight Way	Berkeley	94710	-	13,558	13,558
85	1634	Napa State Hospital	2100 Napa Vallejo Hwy	Napa	94558	-	13,510	13,510
86	2815	Tegrant Diversified Brands, Inc	3466 Enterprise Ave	Hayward	94545	-	13,324	13,324
87	9183	Napa-Vallejo Waste Management Authority	End Eucalyptus Rd	Napa	94558	2,303	10,971	13,273
88	1784	San Francisco International Airport	San Francisco International Airport	San Francisco	94128	355	12,783	13,138
89	41	Owens Corning Insulating Systems, LLC	960 Central Expressway	Santa Clara	95050	-	12,184	12,184

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90	475	Santa Clara Valley Health & Hospital System	751 So Bascom Avenue	San Jose	95128	-	11,895	11,895
91	20065	Solyndra, Inc	47488 Kato Road	Fremont	94538	-	11,618	11,618
92	148	Ball Metal Beverage Container Corp	2400 Huntington Drive	Fairfield	94533	-	11,500	11,500
93	459	Veterans Administration Medical Center	4150 Clement Street	San Francisco	94121	-	11,414	11,414
94	18198	New WinCup Holdings, Inc	195 Tamal Vista Boulevard	Corte Madera	94925	-	11,313	11,313
95	1403	City of Santa Rosa Wastewater Treatment	4300 Llano Road	Santa Rosa	95407	5,397	5,703	11,100
96	2025	University of San Francisco	2130 Fulton Street	San Francisco	94117	-	10,960	10,960
97	5905	City of Sunnyvale/Public Works Dept	301 Carl Road	Sunnyvale	94089	1,223	9,694	10,917
98	17052	BioMarin Pharmaceutical Inc	46 Galli Drive	Novato	94949	-	10,735	10,735
99	3256	Turk Island Solid Waste Disposal Site	Union City Boulevard	Union City	94587	4,949	5,751	10,700
100	79	Morton Salt, Inc	7380 Morton Avenue	Newark	94560	-	10,692	10,692
101	3464	City of Santa Clara	5401 Lafayette	Santa Clara	95050	1,904	8,787	10,691
102	10861	Northrop Grumman Systems Corporation	401 E Hendy Ave.	Sunnyvale	94088	-	10,492	10,492
103	20330	Olam West Coast Inc	1350 Pacheco Pass Hwy	Gilroy	95020	-	10,388	10,388
104	1941	Sonoma Developmental Center	15000 Arnold Drive	Eldridge	95431	-	10,320	10,320
105	10742	John Muir Medical Center	1601 Ygnacio Valley Road	Walnut Creek	94598	-	10,312	10,312
106	12557	The Coca Cola Company, Inc	1201 Commerce Boulevard	American Canyo	94503	5,358	4,932	10,290
107	227	Criterion Catalysts Company LP	2840 Willow Pass Road	Pittsburg	94565	-	10,101	10,101
108	450	Veterans Administration Medical Center	3801 Miranda Avenue	Palo Alto	94304	-	10,095	10,095
109	705	Vulcan Materials, Western Division	52 El Charro Road	Pleasanton	94588	-	9,944	9,944
110	11661	Rhodia Inc	100 Mococo Road	Martinez	94553	-	9,786	9,786
111	12967	TRC	James Donlon Blvd	Antioch	94509	4,450	5,228	9,677
112	3312	Zanker Road Resource Management, Ltd	705 Los Esteros Road	San Jose	95134	1,209	7,959	9,168
113	3273	Pacific Union College	1 Angwin Avenue	Angwin	94508	-	9,038	9,038
114	927	California Oils Corporation	1145 Harbour Way, South	Richmond	94804	-	8,904	8,904
115	14327	Silgan Containers Mfg Corp	2200 Wilbur Avenue	Antioch	94509	-	8,400	8,400
116	1753	John Muir Health - Concord Campus	2540 East Street	Concord	94520	-	8,380	8,380
117	4272	El Camino Hospital	2500 Grant Road	Mountain View	94040	-	8,309	8,309
118	20459	Tesla Motors Inc	45500 Fremont Blvd	Fremont	94538	-	8,227	8,227
119	11887	Dynegy Oakland LLC	50 Martin Luthr Kng, Jr Way	Oakland	94607	-	8,186	8,186

Table X:

2011 BAY AREA MAJOR (TOP 200) GHG EMITTING FACILITIES

Updated January 2015

						CO2 Equivalent Emissions (Metric Tons per year)		
No.	**Plant #**	**Plant Name**	**Plant Address**	**City**	**Zipcode**	**Biogenic**	**Non-Biogenic**	**Total**
120	9455	American Licorice Company	2477 Liston Way	Union City	94587	-	8,106	8,106
121	5691	Sunquest Properties Inc	Landfill, Brisbane	Brisbane	94005	1,834	6,118	7,952
122	1995	Solano County Facilities Operations	501 Delaware Street	Fairfield	94533	-	7,571	7,571
123	255	Lawrence Livermore National Laboratory	7000 East Avenue	Livermore	94550	-	7,251	7,251
124	4446	Veterans' Home of California	100 California Dr.	Yountville	94599	-	7,179	7,179
125	13683	Mylan Specialty L P	2751 Napa Valley Corp Dr	Napa	94558	-	7,002	7,002
126	3590	City of Berkeley/Engr Div/Public Works	Cesar Chavez Park	Berkeley	94704	3,162	3,770	6,932
127	12870	Shell Chemical LP	10 Mococo Road	Martinez	94553	-	6,752	6,752
128	1004	SFSU Housing Facilities (Cogeneration Plant)	1600 Holloway Avenue	San Francisco	94132	-	6,673	6,673
129	2561	Shoreline Amphitheatre	One Amphitheatre Parkway	Mountain View	94043	2,989	3,565	6,554
130	550	NASA-AMES Research Center	Moffett Field NS	Mountain View	94035	-	6,263	6,263
131	15117	Bay Sheets	6791 Alexander St	Gilroy	95020	-	6,232	6,232
132	2457	Regional Medical Center of San Jose	225 N Jackson Avenue	San Jose	95116	-	6,189	6,189
133	3194	City of Alameda, Maintenance Service Center	Doolittle Drive	Alameda	94501	2,771	3,304	6,075
134	4175	City of San Jose (Singleton Road Landfill)	885 Singleton Road	San Jose	95111	2,506	3,551	6,058
135	11374	WD Media, Inc	1710 Automation Pkwy	San Jose	95131	-	5,879	5,879
136	110	Burke Industries, Inc	2250 So 10th Street	San Jose	95112	-	5,846	5,846
137	128	Syar Industries, Inc	Lake Herman Road	Vallejo	94591	-	5,838	5,838
138	12965	John Zink Company	2150 Kruse Drive	San Jose	95131	-	5,777	5,777
139	15816	Cal-Pox, Inc	103 Shoreline Parkway	San Rafael	94901	786	4,926	5,713
140	14511	Gilroy Energy Center, LLC (Wolfskill Energy Ctr)	2425 Cordelia Road	Fairfield	94534	-	5,695	5,695
141	23	General Chemical West LLC	525 Castro Street	Richmond	94801	-	5,525	5,525
142	7264	California Pacific Medical Center	3700 California Street	San Francisco	94118	-	5,362	5,362
143	8025	Novartis Vaccines and Diagnostics	4560 Horton Street	Emeryville	94608	-	5,306	5,306
144	8287	Coca-Cola	5800 3rd Street	San Francisco	94124	-	5,263	5,263
145	17559	Plains Products Terminals LLC	2801 Waterfront Road	Martinez	94553	-	5,199	5,199
146	5178	Kaiser Foundation Hospital	401 Bicentennial Way	Santa Rosa	95403	-	5,075	5,075
147	15885	Kaiser Foundation Hospital	700 Lawrence Expressway	Santa Clara	95051	-	4,911	4,911
148	10271	Darling International	429 Amador Street	San Francisco	94124	2	4,850	4,851
149	632	Intel Corporation	2150 Mission College Blvd	Santa Clara	95054	-	4,799	4,799

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Updated January 2015

						CO2 Equivalent Emissions (Metric Tons per year)		
No.	**Plant #**	**Plant Name**	**Plant Address**	**City**	**Zipcode**	**Biogenic**	**Non-Biogenic**	**Total**
150	14416	Goose Haven Energy Center	3853 Goose Haven Road	Suisun City	94585	-	**4,760**	**4,760**
151	3670	Kaiser Foundation Hospital	975 Sereno Drive	Vallejo	94589	-	**4,752**	**4,752**
152	17315	C & H Sugar Company, Inc	830 Loring Avenue	Crockett	94525	-	**4,671**	**4,671**
153	17456	Peet's Coffee and Tea Inc	2001 Harbor Bay Pkwy	Alameda	94502	-	**4,623**	**4,623**
154	17560	Mission Foods	23423 Cabot Blvd	Hayward	94545	-	**4,594**	**4,594**
155	9347	City and County of San Francisco	850 Bryant Street	San Francisco	94103	-	**4,511**	**4,511**
156	16023	Georgia-Pacific Corrugated LLC	2800 Alvarado Street	San Leandro	94577	-	**4,501**	**4,501**
157	11596	Berkeley Farms Inc	25500 Clawiter Road	Hayward	94545	-	**4,491**	**4,491**
158	3885	Highland Hospital	1411 E 31st Street	Oakland	94602	-	**4,488**	**4,488**
159	14415	Gilroy Energy Center LLC	5975 Lambie Road	Suisun City	94585	-	**4,422**	**4,422**
160	19243	General Service Administration	345 Middlefield Road	Menlo Park	94025	-	**4,399**	**4,399**
161	8316	USCG Training Center	599 Tomales Road	Petaluma	94952	-	**4,354**	**4,354**
162	20752	FlexEnergy Energy Systems	5885 Hollis Street	Emeryville	94608	-	**4,341**	**4,341**
163	15565	Western Digital Corporation	44100 Osgood Road	Fremont	94539	-	**4,336**	**4,336**
164	595	Mission Valley Rock Co	7999 Athenour Way	Sunol	94586	-	**4,316**	**4,316**
165	678	Port of Oakland	#1 Airport Drive	Oakland	94621	-	**4,296**	**4,296**
166	14414	Creed Energy Center LLC	6150 Creed Road	Suisun City	94585	-	**4,277**	**4,277**
167	167	Kraft Foods Group, Inc	100 Halcyon Drive	San Leandro	94578	-	**4,214**	**4,214**
168	2168	Jelly Belly Candy Company	One Jelly Belly Lane	Fairfield	94533	-	**4,200**	**4,200**
169	279	Agilent Technologies	1412 Fountaingrove Pkwy	Santa Rosa	95403	-	**4,054**	**4,054**
170	1371	Dublin San Ramon Services District	7399 Johnson Drive	Pleasanton	94588	**522**	**3,519**	**4,041**
171	73	Gallagher & Burk, Inc	344 High Street	Oakland	94601	-	**4,019**	**4,019**
172	2035	SVC Manufacturing, Inc dba Pepsico	1175 57th Avenue	Oakland	94621	-	**4,000**	**4,000**
173	2158	Syar Industries Inc	2301 Napa Vallejo Hwy	Napa	94558	-	**3,988**	**3,988**
174	11783	Zanker Road Material Processing Facility	675 Los Esteros Road	San Jose	95134	**509**	**3,407**	**3,916**
175	68	Granite Rock	365 Blomquist Street	Redwood City	94063	-	**3,909**	**3,909**
176	20637	Boehringer Ingelheim Fremont Inc	6701 Kaiser Drive	Fremont	94555	-	**3,877**	**3,877**
177	12749	CertainTeed Corporation	6400 Stevenson Blvd	Fremont	94538	-	**3,813**	**3,813**
178	13443	Granite Construction Co	1544 Stanley Boulevard	Pleasanton	94566	-	**3,806**	**3,806**
179	19432	PPF Paramount One Market Plaza, LP	One Market Street	San Francisco	94105	-	**3,675**	**3,675**

Table X:

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Updated January 2015

						CO2 Equivalent Emissions (Metric Tons per year)		
No.	**Plant #**	**Plant Name**	**Plant Address**	**City**	**Zipcode**	**Biogenic**	**Non-Biogenic**	**Total**
180	17437	Philips Lumileds Lighting, Inc	370 W Trimble Road	San Jose	95131	-	**3,653**	**3,653**
181	9618	San Francisco State University	1600 Holloway Avenue	San Francisco	94132	-	**3,612**	**3,612**
182	1860	Laguna Honda Hospital	375 Laguna Honda Boulevard	San Francisco	94116	-	**3,591**	**3,591**
183	12848	David Grant Medical Center	101 Bodin Circle	Travis AFB	94535	-	**3,587**	**3,587**
184	7053	Dutra Materials/San Rafael Rock Quarry Inc	961 Western Drive	Richmond	94801	-	**3,543**	**3,543**
185	13584	Bodean Company Inc	1060 Maxwell Drive	Santa Rosa	95401	-	**3,540**	**3,540**
186	1579	Granite Rock Company	1321 Lowrie Avenue	South San Franc	94080	-	**3,526**	**3,526**
187	3613	St Mary's Medical Center	450 Stanyan Street	San Francisco	94117	-	**3,481**	**3,481**
188	460	Alta Bates Hospital	2450 Ashby Avenue	Berkeley	94705	-	**3,459**	**3,459**
189	2440	Sequoia Hospital / Dignity Health	170 Alameda, de las Pulgas	Redwood City	94062	-	**3,458**	**3,458**
190	20749	FlexEnergy Energy Systems	5858 Horton Street	Emeryville	94608	-	**3,431**	**3,431**
191	2957	Super Store Industries/Fairfield Dairy Division	199 Red Top Road	Fairfield	94533	-	**3,321**	**3,321**
192	10408	County Asphalt	5501 Imhoff Drive	Martinez	94553	-	**3,284**	**3,284**
193	11002	Applied Materials	974 E Arques Avenue	Sunnyvale	94085	-	**3,277**	**3,277**
194	453	Good Samaritan Hospital	2425 Samaritan Drive	San Jose	95124	-	**3,243**	**3,243**
195	11924	California Pacific Medical Center	Castro & Duboce Street	San Francisco	94114	-	**3,213**	**3,213**
196	12001	Quikrete Northern California	6950 Stevenson Blvd	Fremont	94538	-	**3,177**	**3,177**
197	1201	Rolls-Royce Engine Services	6711 Lockheed Street	Oakland	94621	-	**3,131**	**3,131**
198	20950	G3 Minerals	Camino Diablo Rd	Byron	94514	-	**3,068**	**3,068**
199	15235	Coulter Forge Company, Inc	1494 67th Street	Emeryville	94608	-	**3,048**	**3,048**
200	723	Lawrence Berkeley National Laboratory	One Cyclotron Road	Berkeley	94720	-	**3,010**	**3,010**
Grand Total (Metric Tons per Year)						**1,035,690**	**28,281,046**	**29,316,736**